NOV 16 1923

TELEPHONE ENGINEER

VOLUME 27 NOVEMBER, 1923 Number 11

Saving Time

TO SAVE time is the aim and end of practically every development of modern industry, and those inventions that save the most time are recognized as the most beneficial to civilization.

Strowger Automatic Telephone Equipment saves time in a number of ways. It saves much of the time the telephone manager spends in administration, the time telephone employes spend in maintenance, testing and other operating duties. Most of all, it saves much of the subscribers' time in setting up telephone connections.

The ability of Strowger Automatic Equipment to save time is one of the reasons for its adoption as the standard for future installations of every size.

Automatic Electric Company

Factory and General Offices: CHICAGO, ILLINOIS

BRANCH OFFICES IN ALL PRINCIPAL CITIES

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INTERNATIONAL AUTOMATIC TELEPHONE COMPANY, LTD. . . . . *London*

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THE NEW CONVERTIBLE
DESK AND WALL TELEPHONES
FOR COMMON BATTERY MANUAL AND AUTOMATIC SYSTEMS

No. 114 Desk Set

Convertible Telephones

For Common Battery exchanges where a possible future change to automatic system is contemplated, it is a wise foresight on any telephones needed in the meantime to purchase these convertible types. The instruments here illustrated show many clever features of construction and adaptability to either system.

Automatic Dial

Any make of dial can be connected and mounted in a few seconds—on desk stand the dial is well over the center of the base, safe from knocks or damage.

No. 166 Wall Type

Neat, pleasing design. Double door steel cabinet—enclosed ringer gongs, safe from tampering. Slotted openings in the cabinet make the ringing of the gongs clearly audible. High efficiency transmitter and receiver. Adjustable transmitter mounting.

No. 114 Desk Set

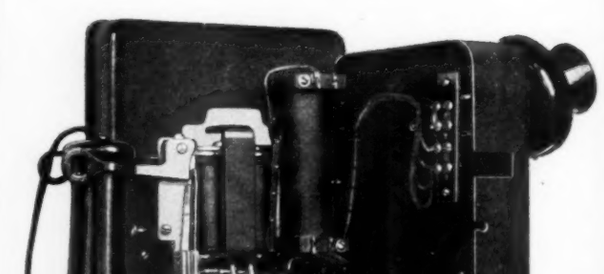
Note simplicity of switch-hook construction. Stand with or without dial. Furnished with new enclosed gong bell box No. 167, similar in construction to the No. 166 wall telephone. Burns Rubber Ring on base prevents slipping of phone when dialing.

Accessibility — Standardization

Every part of these instruments is instantly accessible. Ringer adjustment can be easily made and permanently locked. **Large Booster induction coil.** Substantial removable switch-hook. Convenient line terminals.

American Electric
COMPANY
For Thirty Years Makers of Good Telephones
CHICAGO, U. S. A.

No. 166 Wall Set



Enclosed Gongs

Slotted Case

Let us furnish estimates and full data for your consideration

FULL LINE OF TELEPHONES AND SWITCHBOARDS

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THE TEXAS FINANCING PLAN

Some of the questions asked during the discussion of the plan for financing telephone companies described by Judge S. A. Lindsey of Texas at the recent convention of the United States Independent Telephone Association indicated that a number of people had serious doubts as to the applicability of the plan. Each one present naturally would look at the application of the plan to the circumstances of his own company and many would find it unsuitable. No doubt, some of the questions were due to a lack of understanding of the conditions of its operation and perhaps a misinterpretation of its purpose.

The feature of the plan calling for the payment of monthly installments out of earnings was pointed out as one that would not be likely to receive the approval of public service commissions, as they had invariably rejected the idea of the propriety of paying for plant out of earnings. Likewise, the effect of the plan upon the payment of dividends was called into question.

To get a clearer view of the import of these questions, one line of thought suggests itself. This is an analysis of the nature of the monthly payments. Briefly, the plan involves the amortization of the loan in 96 monthly payments of equal amounts of money, with the exception of the last. Each payment, it may be said, is to consist of two parts. The first portion is the interest charge on the unamortized portion of the loan and the second portion is applied to the reduction of the principal.

As for the first portion of the monthly payment, it is clearly an operating expense and probably no commission would object to a rate that would include the amount necessary to pay this interest charge if it could approve the purpose for which the loan is made. The second portion is a payment on principal of the loan and if the loan were used for extensions could not, in fairness, be taken from the subscribers in addition to a fair return on the total value of the investment in the property. This portion must be furnished by the stockholders either from their own funds or from the earnings which they should receive as a fair return on their equity in the property. If the loan were used to make replacements rather than extensions of plant the problem becomes more difficult and the question as to how far the monthly appropriation to the reserve for depreciation might be used is a complicated one.

From the standpoint of one who is not an accountant, it would seem that there are a number of accounting difficulties that would make the plan somewhat troublesome for a corporation under commission control. It would not seem to be suitable for financing construction of an entirely new plant nor would it be practicable where considerable amounts of money are required annually for plant additions. On the other hand it has undoubted utility in the financing of small plants of slow growth, particularly where the owner is an individual and where the accounting systems required of the larger companies are not used. It also offers a means of financing whereby an ambitious man with half the capital required may finance the purchase of a going property.

There is no question but that Judge Lindsey and his associates have faith in the plan and further reports of their experience in its operation will be awaited with interest. It is to be hoped that it will be tried in other states as well, so that a more extended test of its practicability may be made.

CONNECTING COMPANY RELATIONS.

One of the internal conditions in the telephone field that could be improved with benefit to all is the relations between connecting companies. Every company in the business stands in the relation of a connecting company at least to some degree. The Bell operating companies and some of the larger non-Bell companies are connecting companies of the American Telephone and Telegraph Company. Bell operating units and the larger Independents have smaller Independent systems as connecting companies and small Independent systems have other small Independents and mutual and co-operative lines as connecting companies. The connecting company relation is reciprocal also for the larger companies are connecting in companies of the smaller.

Too often the relations between connecting companies are those of distrust and suspicion rather than of friendly and helpful co-operation. To hear each owner of half of a jointly-owned line tell it, the trouble is always on the other half of the line. Unnecessary checking of messages is done at intermediate points because of a fear that the terminating companies will not report properly. Unfavorable

routings of toll messages are sometimes used in order to gain an advantage in the mileage due some particular company. All of these and many other irregularities lead to misunderstandings, delays in completion of calls, loss of circuit time and generally poor service.

The remedy for these conditions where they exist lies with the telephone companies themselves. It is the duty of each to establish and maintain harmonious and neighborly bonds of union with the companies with whose lines it connects. In general, the burden rests upon the larger companies to make the first move in such matters, but it must be done with tact and due consideration of the rights, opinions and prejudices of the smaller company. When there is evidence of a spirit of fair play, misunderstandings can be cleared away and a common ground can be found for working out such problems as exist.

A consistent effort to do this will certainly result in much improved conditions in the relations between companies which interchange telephone traffic.

A MOST SUCCESSFUL CONVENTION

A promise fulfilled is the best brief description that can be given of the recent convention of the United States Independent Telephone Association. The program published in advance promised many valuable features and the meetings themselves contained not only the things promised but many additional features that were not even hinted at in the advance notices.

In the first place, the attendance was large, every portion of the country from Maine to California and from Montana to Florida being represented. Even Canada had a half dozen representatives. Accommodations were ample and convenient. Exhibits were complete and well manned. The assembly rooms were well filled at the business sessions and the discussions were lively and to the point. Even the Chicago weather man furnished some of his best for the greater part of the four days.

The principal topics that engaged the attention of the convention were of broad general interest and of importance to the welfare of the telephone industry of the future. The gradual enlargement of the activities of the association in traffic, financial and plant matters was indicated by the traffic conference and the papers and discussions on the Texas financial plan, employee's benefit plans and substation protection.

One of the noticeable features was the general air of confidence in the stability of the industry as it is now constituted. Everyone present seemed to have the desire to get information that would enable him to do his job in a better way and to make the service rendered by Independent telephone companies as modern and efficient as it is possible to give. Every man present had cause to feel that he had been priviledged to attend one of the most successful conventions in the history of the Independent telephone industry.

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CONGRATULATIONS

TELEPHONE ENGINEER extends its congratulations to Messrs. MacKinnon and Deering upon their re-election as president and secretary of the United States Independent Telephone Association. Their retention in office is a merited recognition of their services in past years. To the nine directors who were re-elected and to Messrs. McHenry, Melchers, Rolfe and Jones, who are new members of the board of directors of the association felicitations are also due. May they find ample opportunity to be of service to the Independent telephone industry.

AN OUNCE OF PREVENTION

In the many fine days that will come during the month of November and in early December, might it not be a good plan to rebuild a few of those corners, tighten up a few of those guys and pull up some of that slack so that when the real winter arrives we may have that much less work to be done in zero weather amid the blustering breezes that Boreas sends down upon us.

IT'S A WISE MANAGER WHO KEEPS UP COLLECTIONS

We know one manager in a small city who has been improving his spare moments by getting after his collections, particularly from his farmer subscribers. He says if he doesn't get in the money now, he may have to wait until next year. We think he is right.

A DRIVE FOR RIGHT RATES

In pointing to the increased earnings Independents can get by raising rates to the Bell schedules President MacKinnon revealed the opportunity for making Independent securities stand high in public esteem. The opportunity is one which calls for constructive action such as is evident it will get at the hands of the Independent body.

General co-operation is vital for the drawback of one manifestly low and unfair rate affects the situation in contiguous territory.

LINE AND DESK

FIRE HOSE TAKES PLACE OF DUCT RODS

This evening while reading the last issue of TELEPHONE ENGINEER, there came to my mind a stunt pulled by our construction foreman a few days ago. I believe it worth passing on.

While pulling in a small cable underground through conduit, the rope broke and there was no chance to rod the duct as the manholes were of too small diameter to allow our type of duct rods to be connected.

Going to a sporting goods store, the foreman bought a defective tennis ball and 300 feet of heavy fishing line. He next went to the fire department and borrowed a nozzle and enough hose to reach to the nearest fire plug. The string was stretched out on the street and one end was fastened to a rag wrapped around the tennis ball. The ball was then pushed far enough into the duct to be ahead of the nozzle. The water was turned on and that ball went through the duct about as fast as anything could travel. The water pressure is 85 lbs. per square inch and the nozzle being slightly smaller than the duct gave the water no chance to back up.

About 15 minutes time was needed to pump the water from the far manhole and we were ready for a new line.

This stunt is all right where ducts are tight and have good drainage.

High water pressure has been used to force mud out of ducts but this is the first time I know of it being used in place of rods.

—Contributed by C. W. Kugelman.

CONCERNING GAS MASKS

In a recent number of the "Travelers Standard," attention is called to some misapprehensions in regard to gas masks. Many people seem to regard the gas mask as a device that can be used wherever there is danger of suffocation or exposure to poisonous gases. As matter of fact it is effective only in absorbing certain gases but in its ordinary form it will not absorb carbon monoxide which is a very common kind of poisonous gas, existing, for instance, in the exhaust of an automobile engine. Neither will it supply oxygen when the oxygen content of the air is so small as to cause suffocation. In view of this testimony, it would seem that the best method of dealing with gassy manholes is the old fashioned one of using a blower or fan rather than depending on the gas mask.

BUGS WE HAVE SHOT

The following case of trouble was related to me by the manager of a local battery exchange. The manager while repairing a telephone noticed that the generator turned rather stiffly and asked the lady of the house if she had some sewing machine oil. She gave him a small bottle and he proceeded to oil the bearings. As the generator turned much more easily, he went on his way. The next morning a report came from a neighbor's telephone that the crank at the station where the repairs were made would not turn. A visit showed this to be the case and when the generator was taken apart the bearings were badly gummed. The manager then asked to see the bottle of oil which he had used and upon closer examination found that it contained varnish. — Contributed.

PROFESSIONAL ETHICS OF OPERATING

Most of our inefficient operating is due more to lack of adequate teaching and training than to the lack of effort on the part of an individual. On the other hand, after we have been sufficiently instructed, it is up to us to do a little self-development. A little conscious effort on our part will do a great deal toward making us efficient. The way to know what we can do is to work with all our might and be willing to take responsibility. The more we know about our work the easier it becomes.

Part of the daily work of each girl should be in helping to bring about confidence and understanding, and keeping the public thoroughly satisfied—and this can be brought about only through co-operation. Every community is daily demanding more and better service. What a great responsibility rests upon our shoulders. I wonder how many of us look upon our work as a profession. I am sure that if we did, our outlook and attitude would be entirely changed. The doctor, the lawyer, and the minister pride themselves on the benefits their professions contribute to society. It seems to me that as great benefit may come about through our efforts at the switchboard. I for one wish for this state a standard and standing that we will be proud of.—Pearl Thompson, Traveling Chief Operator, Illinois Telephone Association.

TWO NEAT BITS OF CABLE WORK

The first picture is a pull-over to hold the aerial cable clear of an ob-

struction. The second is a workmanlike job of capping the riser pipe at a terminal pole.

WORK PLANNED AHEAD REDUCES LOST TIME

The secret of Henry Ford's success as an industrial leader can, without question, be laid to the fact that he and his lieutenants have had the ability of organizing their working force so that the greatest amount of work may be done satisfactorily in the smallest amount of time; in other words, planned work with the most possible efficiency, with an eye to economical operation and maximum production. To do good work efficiently and economically, the workman's tools must be kept up. No man can do good work neatly and quickly with dull tools. The plan to have tools in proper working order should be the first essential in the saving of time. Another thing, be sure to have all the material necessary to do the job you set out to do before leaving the storeroom and thus avoid delay by having everything needed. Don't do things haphazardly, for your work will be in vain. Know

what you are going to do before you start.

In making installations where more than one man is used, one man should start stringing the drop immediately, from the terminal. Much time is sometimes lost in getting started, in that both men go into the subscriber's house to see where the telephone is to be located.

The rackman should be on the job to see that no time is lost waiting for a line to be cut in. Where it is seen that the telephone can be installed cheaper by changing the intended location, and yet be as advantageous to the subscriber, it should be taken up with the subscriber and done the cheaper way, providing, of course, that it meets with the approval and satisfaction of the patron.

Lastly, let's keep efficiency uppermost in our minds, remembering that law of economics that what hurts the business hurts us, and what helps it, helps us. If more work can be done at less expense, the employe will reap the benefit, as well as the employer. No concern can pay maximum wages without maximum efficiency from their workmen and remain permanently in business.

In our line of work, we are left much to ourselves. It is up to the individual to be sincere, to work to the best advantage, to concentrate on each problem as it arrives, that the work he sets out to do will be accomplished with but little wasted time.—Carl T. Nelson in "The Mouthpiece."

TELEPHONE'S GROWTH IN THE U. S.

People per telephone:

57 in 1900
21 in 1905
12 in 1910
10 in 1915
7 in 1923

If all the telephones in this country (more than 15,000,000) were placed side by side they would enclose Lake Erie and Lake Ontario.

Chicago, Ill.—During 1924 the Illinois Bell Telephone Co. is to spend in the state $18,670,426 for improvements, according to expenditure plans already authorized.

Philadelphia, Pa.—The Bell Telephone Co. of Pennsylvania's 1923 construction plan which was set at the start of the year for $25,000,000, will reach the $30,000,000 mark before the year is out.

The Bell system handles 38,354,000 completed telephone calls daily, of which 1,523,000 are toll or long distance calls.

SHE COULD GET NO ANSWER

By H. E. ELDRIDGE

Miss Susan Brown was a maiden fair,
With eyes of blue and golden hair.
She lived out West in a little town,
A village quaint of great renown.

Now Susan dear was the family pet,
Her slightest wish was ever met;
But, not content to sit at home,
To seek employment she did roam.

The 'Phone Exchange was "on the square,"
And Sue's first thought was to try it there.
She liked the work, and doing it right,
Was given sole charge of the Exchange at night.

One night at eleven, when all was quiet,
She suddenly heard a fearful riot.
With never a thought of leaving her post,
She ran downstairs as pale as a ghost.

But, alas, for Susan, so great was her shock
She forgot that the door had a patent lock.
She soon remembered, but to no avail,
And the nearest 'phone was under the jail.

In dire distress she ran to the booth
To call the manager and tell the truth.
But Susan's brain was in such a whirl
She forgot that she was the "Hello" girl.

Ten minutes she waited, still no "Number, please"
Then the manager entered and the "trouble" sees.
And now Miss Brown at home will stay,
For "Mamma's so lonesome" when she's away.

By request we reprint above the deathless classic of the absent-minded operator. It appeared first in the Operators' Bulletin of May, 1910. Its author, H. E. Eldridge, is Division Supt. of Traffic for the Illinois Bell Telephone Co. He is a brother of Frank Eldridge of the French Battery and Carbon Co.

New Bedford (Mass.) Acquired by the Bell

New Bedford, Mass.—The New England Telephone & Telegraph Co. has received permission from the interstate commerce commission to take over the property of the Automatic Telephone Co. of New Bedford, Mass. The two systems will hereafter be operated as a unit.

DATA SHEET CORRECTION

We are in receipt of the following interesting letter from Paris regarding the data sheet on "International Screw Threads" which we published in our August issue. This letter throws much light on the standards published in this country and those actually in use in Europe. Possibly, the subject needs little comment as attached letter fully explains the points under discussion. Suitable corrections will be made however, in our data sheet as soon as we have had opportunity to check up the matter. We are very grateful to Mr. Domon for his interest and trust that whenever such discrepancies occur we shall be notified by others, as Mr. Domon has done.

The system quoted in our August data sheet is that adopted by the International Congress for the Unifying of Screw Threads, held in Zurich, Switzerland. Comparing these values with those in Mr. Domon's letter suggests that the "standard" systems of Europe are about as fickle and changeable as those in this country where a whole accepted system of standards frequently is junked over night. One ray of joy in the affair is that the Pratt and Whitney Co. are in the same boat with us. Here is Mr. Domon's letter:

As an employee of the French Associated House of the Western Electric Co., I read in your clips: "Standard screws" covering International standard threads, some data which I believe do not correspond with the regular S. I. sizes. We use this form of thread and for the small sizes, under diameter of 6 m/m which are known as "Système International Prolongé," the dimensions are thus:

Diameter	Pitch
6	1
5.5	0.9
5	0.9
4.5	0.75
4	0.75
3.5	0.60
3	0.60
2.5	0.45
2	0.39

I recognize it is easy to become confused because the pitches of that small series have been discontinued. Therefore, I verified by the papers published by the "Société d'Encouragement pour l'Industrie Nationale," but I never find pitches of 0.55, 0.70 and 0.85 as Mr. Rathbun shows for diameters of 3, 4 and 5 m/m.

The differences I find between the different pitches are merely on the 2.5 m/m screw for which some people use the same pitch as per the 2 m/m screw: 0.45, in order to follow the normal sequence of two per two used as a rule for the other screws of the scale.

I have in hand also data of the Pratt & Whitney Co. which gives a pitch of 0.75 for the 5 m/m S. I. screw; neither does this size correspond with the standard international scale which we use.

I hope, dear sirs, to obviate some troubles for your readers who are not accustomed to the metric screw sizes and might therefore make some mistakes if they follow your data which I maintain to be not correct for the small scale.

Yours very truly,

R. E. DOMON,

Head of Planning Branch, Le Matériel Téléphonique, 46 Avenue de Breteuil, Paris.

Probe Independent Problems

United States Independent Telephone Association in Big Chicago Meeting Deals with Affairs of Men and Money — Substation Protection Discussed — Many Exhibits

By Staff Correspondent

Another successful convention of the United States Independent Telephone Association passed into history during the week of October 23-26th. The three days of the convention proper were packed with matters of business and discussion of policies and projects of importance to the industry. The first day of the convention was devoted to reports of officers and appointments of committees. During the sessions the report of the committee on code of ethics was heard and the matter placed on the Friday morning program for discussion.

The Wednesday morning session was the largest in the point of attendance of the entire convention, more than 500 being present in the convention hall. The principal topics were the report of Prof. R. V. Achatz on "Substation Protection" and the address of Judge S. A. Lindsey of Texas on "Financing of Telephone Companies." The program closed with a spirited address by Prof. R. E. Pattison Kline of Chicago on the subject, "The Challenge to the American Mind." Two separate conferences made up the Wednesday afternoon program. The executives of Class A companies met under the leadership of President MacKinnon and the traffic executives met in charge of the association traffic committee consisting of C. C. Deering, F. V. Newman and H. E. Bradley.

All of Thursday was given over to the meeting of the Independent Telephone Pioneers' Association and the business of the convention was resumed on Friday morning with the discussion of various reports and addresses. On Friday afternoon the state association executives met in the final conference of the convention.

President MacKinnon's Address

President MacKinnon opened the first session of the convention at 2:30 o'clock, on Tuesday, October 23rd. The first subject was the report of the activities of the association and its officers for the past year. The report of President MacKinnon outlined the activites of the busiest twelve months the association has had for many years. At the last convention the two principal problems were outlines as those of men and of money and a considerable amount of time has been devoted to a study of the methods of attracting and holding desirable men in the independent industry and of methods of financing the extensions of plant which are necessary.

The question of financing companis has been studied largely from the standpoint of the small, or Class D, company, and a step of progress has been made in the development of the "Texas Plan." While this plan is workable for some larger companies, it is particularly applicable to Class D companies.

The association has been active in a number of questions during the year. The Interstate Commerce Commission has been considering its procedure in regard to depreciation and the board of directors has been representing the membership of the association at the hearings. A brief of the position of the association was prepared by Mr. Randall, of St. Paul, and Mr. Beyer, of Grinnell, Ia. This matter is moving very slowly because when a body like the Interstate Commerce Commission once realizes the problem, they find it much more serious than they had expected and naturally take a longer time to solve it.

A statement was prepared and filed with the Interstate Commerce Commission recommending that the classification of telephone companies be changed. The commission issued its order in August, reclassifying the companies. The D companies now include all of the former C companies. The D company today is one whose annual operating revenues amount to $50,000 or less. The C company is a company whose annual operating revenues run from $50,000 to $100,000; and the B company from $100,000 to $250,000. There are now 92 class C companies, 72 class B companies and 37 class A companies. Class D companies are relieved from making reports to the Interstate Commerce Commission except that they must file copies of the report made to state commissions. Only class A and B companies under the new classification will be required to comply with the proposed order in respect to depreciation.

The association has been active in connection with the presentation of income tax cases. A new ruling by the treasury department provides that when a field agent makes an audit he is required to send a copy to the company and cannot file his report with the collector for 20 days after the copy has been sent. During the 20 days the company has right to protest against the findings or to present further facts or claims. This will greatly relieve matters as long delays are the result if the report once gets into the routine of handling through official channels.

Operation during the year under the procedure outlined in the so-called Hall Memorandum has continued. Outside of two large transfers—the Kinlock of St. Louis and the Citizens of Grand Rapids—there have been seven transfers of property to the Bell companies, involving a total of 4,600 stations. At the same time other companies have acquired approximately the same number of stations. In general, the arrangement has been working out satisfactorily. The great difficulty is in the toll connections so that no neighbor is hurt. It is sometimes difficult to find out just what procedure should be used to protect all parties.

Independents Have General Staff

In discussing the proposal that the Independents have a general staff, Mr. MacKinnon pointed out that there is a general staff but it has not been used. One of the things that must be done is to call into operation this general staff. The active co-operation of the Class A companies is necessary in this. During the year a meeting of presidents and general managers of Class A companies will be held and they are going to be called upon to give consideration of the use of this staff in formulating proper standards of operation and to provide the necessary engineering, legal, accounting and commercial advice. If the Class A companies join in this movement it will not succeed unless the other companies also give their active co-operation.

During the year an intensive study of operating and financial conditions of the members of the association also will be made. One of the difficulties with the situation is that the rate structure in many states is on a wrong basis

and with some companies is on such a low level that it is affecting the operation of all companies in the locality. The 37 Class A companies having an investment of more than $200,000,000, last year earned 7½ percent on their common stock after paying interest on their bonds. In 1922 the Bell companies earned on investment in fixed capital, 5.6 percent. Independent Class A companies earned on their investment in fixed capital, 5.2 percent. If they increased their revenue to the level of the Bell group the amount available for dividends on common stock would be raised from 7.5 percent to 8.5 percent.

Under the new classification there are 72 Class B companies operating 373,000 stations and having an investment in fixed capital of $37,000,000. Their return on the investment was 5.4 percent and the amount available for dividends on the common stock was 8.2 percent. If the Class B companies can do this, why not the Class A? When you get down to the Class D companies the average is lower and it has been slipping steadily since the war due to the fact that these companies have not adjusted rates to meet new conditions. This is keeping the entire rate level down and is handicapping the man who is trying to adjust his finances on a proper basis.

This gives some idea of the general problem of how to bring about the condition that the security buying public all over the country will recognize an Independent security as a good invstment.

In closing Mr. MacKinnon said that several years' study had brought the conclusion that the time has arrived for the Independent group to get down to business.

Secretary-Treasurer C. C. Deering presented his report following that of President MacKinnon. He reported 893 members of the association, including 847 telephone companies; associate, 13; foreign associations, 6; state association secretaries, 24; honorary, 3. The financial support is largely derived from contributions of 332 operating telephone companies and 37 manufacturers.

The next business taken up was the report of the committee on code of ethics. John Z. Miller of Erie, Pa., reported for the committee which was made up of Mr. Miller, Chairman; F. H. Gardiner of Oberlin, Ohio; John H. Wright of Jamestown, New York; P. J. Weirich, of Monroe, Wis., and E. L. Chase of Kansas City, Mo. Following the report discussion of which was deferred till Friday morning, H. E. Bradley of Harrisburg, Pa., reported for the committee on long distance operating rules. Mr. Bradley said that Miss Barnes of Des Moines, Iowa, and Miss Vavasour of Albany, New York, were going over the rules of the Bell company and were making modifications necessary for adaptation to Independent practice. It was expected that the report would be ready by the end of the year.

Employes' Benefit System Is Discussed

Secretary Deering next presented a report on the Employes' benefit system. Court expense and lost time in case of accidents has cost much in the past but workingmen's compensation laws have been enacted that have not greatly increased costs to the employer but have greatly benefited the employe. Some companies, particularly the Bell companies and large Independents have established benefit systems that go further than the laws require in making payments to employes in case of sickness and accidents occurring outside the course of employment. Mr. Deering's conclusions were that the cost to a company carrying accident, health and life insurance on its employes is paying more than a company having a benefit plan. It was found that no nationwide plan could be adopted but further consideration is being given of a state plan.

After the appointing of a nominating committee and judges of election and the resolutions committee, President MacKinnon introduced to the Convention, W. J. Thompson, president of the Maine Telephone Association; Ernest Erwin, secretary of the California Independent Telephone Association; Jay Greaves, president of the Minnesota Telephone Association and R. B. Still of the Texas Telephone Association. Judge C. E. Rugh, a member of the Kansas Public Utilities Commission then made a brief talk on the relations between utilities and their subscribers. R. B. Adams of Missoula, Mont., telephone engineer in the U. S. Forestry service; Col. C. H. Atkins of the Southern Bell Telephone Company and C. H. Atkins president of the Vermont Telephone Association were also introduced before the convention adjourned for the day.

Wednesday Morning Session

When the Wednesday morning session opened, President MacKinnon carried further his idea of the previous day introducing people from various places to the convention. Each one called upon made a few brief remarks in response. Among those introduced were: W. G. Brorein of Tampa, Fla.; Dr. Frank A. Wolff, chief of the telephone section of the Bureau of Standards, Washington, D. C.; Charles E. Wells of Hillsboro, Ore.; Miss Anne Barnes of Des Moines, Ia., and Francis Dagger of Toronto, Canada. Resolutions were then presented by C. D. Cushing, president of the Vermont Telephone Association; G. B. Adams, vice-president of the New Hampshire Telephone Association and W. J. Thompson of the Maine Telephone Association. All of these resolutions recommended the repeal of the present tax on telephone messages.

The regular program of the morning was then taken up. This included a report on "Substation Protection" by R. V. Achatz, associate professor of telephone engineering of Purdue University and an address on "Financing Telephone Properties" by Judge S. A. Lindsey of Tyler, Texas. Abstracts of both papers appear on other pages. Professor R. E. Patterson Kline of Chicago then made an address on the subject "The Challenge to the American Mind." This proved to be a very illuminating and thought provoking survey of some of the present national problems in their larger aspects.

New Directors Are Elected

The nominating committee then presented its report recommending the election of eleven directors which was done unanimously. The following men were elected: J. B. Earle, Waco, Texas; George R. Fuller, Rochester, New York; W. F. Goodrich, La Crosse, Wis.; R. E. Gordon, ElPaso, Ill.; H. L. Harris, Kansas City, Mo.; C. L. Jones, Athens, O.; Frank A. Knapp, Bellevue, O.; G. W. Robinson, Saint Paul, Minn.; C. A. Rolfe, Redlands, Cal.; E. D. Schade, Johnstown, Pa., and C. A. Shock, Sherman, Tex. Mr. Jones and Mr. Rolf were elected to succeed C. Y. McVey and F. L. Beam who asked that their names be not presented. The others have been serving as directors and were re-elected. Houck McHenry of Jefferson City Mo., and W. J. Melchers of Owosso, Mich., had previously been selected by the Board of Directors to fill unexpired terms caused by resignation of W. S. Vivian and C. E. Tarte.

Executive and Traffic Conferences

Wednesday afternoon was devoted to sectional conferences. The presidents and general managers of class A companies met under the leadership of President MacKinnon for a discussion of questions relative to co-operation so that the services of legal, accounting and engineering staffs may be available for service to the association. No definite plan was decided upon but representatives will probably meet at various times to discuss problems as they come up.

Traffic superintendents, supervisors, chief operators and others gathered

for the traffic conference. The opinion that a revision of the rules was necessary was expressed and that the rules as used by the Bell companies were too voluminous for small exchanges. The loose leaf form was favored and it was proposed that copies of rules should be placed in the hands of each operator. A motion was passed authorizing the committee to go ahead and formulate a code of rules suitable for the small exchange.

Final Meeting on Friday Morning

Friday morning's time was devoted to discussion of various reports that had been made earlier in the convention.

The first subject was the proposed code of ethics. John Z. Miller of Erie, Pa., read suggestions that had been made for changes in the code as proposed by the committee. Amendments were made to some of the sections and an entire new section on relations with regulatory bodies was added. After discussion by a number of men including G. W. Schweer of Clinton, Mo.; C. E. Wells of Hillsboro, Ore.; Judge S. A. Lindsey of Tyler, Tex.; Carl Wilde of Indianapolis, Ind., and E. L. Chase of Kansas City, Mo., upon motion of Judge Lindsey, the code was adopted.

The principal discussion of the report on Substation Protection was given by Mr. W. S. Boyd, secretary Western Association of Electrical Inspectors. Mr. Boyd discussed a number of details of the report calling attention to features that seemed to him to be important from a fire prevention standpoint. He expressed a hope that the association would be represented when future revisions of the National Electrical Code were made. R. B. Adams of the U. S. Forest Service; F. H. Runkel of Portage, Wis., and George R. Folds of the Cook Electric Company, Chicago, Ill., also took part in the discussion. Upon motion of G. W. Schweer, the two recommendations of the report, further study and co-operation with the Underwriters in revision of the Code and the drafting of a recommended specification for substation protection of rural telephone, were adopted.

A spirited discussion of the Texas financing plan suggested by Judge Lindsey took place. Some of the speakers questioned the possibility of applying the plan in states where telephone companies were under commission regulation. It was pointed out that the plan was particularly suited for small companies where the ownership was private or a partnership. G. W. Robinson of Saint Paul; Ernest Erwin of Pomona, Cal.; H. L. Beyer of Grinnell, Ia.; Geo. X. Cannon of Freeport, Ill., and Max F. Hosea of Indianapolis, Ind., took part in the discussion. A vote of thanks was given Judge Lindsey for presenting the plan and it was referred to the board of directors of the association for further consideration.

Announcement was made that the board of directors had elected officers for the ensuing year as follows: President, F. B. MacKinnon; first vice-president, J. B. Earle; second vice-president, Geo. W. Robinson; third vice-president, E. D. Glanson; secretary-treasurer, C. C. Deering.

The resolutions committee report was then made and the resolutions adopted. Among them were votes of appreciation to the committee on ethics, to President MacKinnon and Secretary Deering and to the Hotel Sherman, also to those contributing to the program. A resolution recommending the repeal of the telephone message tax was adopted and a resolution of sympathy and condolence on the passing of the following men: J. L. W. Zietlow, James A. Devore, W. W. Dean, D. W. Greatorex, W. M. Bailey, Nathan Heineman, J. A. Hudson and A. M. Howell.

A few moments were spent in discussion of employes' benefit plans. George W. Robinson told of the plan in force in his company. E. D. Glandon told of the profit sharing plan that had been adopted by his company which was too small to work out an employes' benefit plan along the lines used by the larger companies. As there was no further business the meeting adjourned shortly after one o'clock on Friday, October 25th.

Substation Protection Views

Report of Independents' Committee on Substation Shows Current Practice and Indicates Factors Governing Prospective Installation—Digest of Statement

By R. V. Achatz

Four points of the substation protection problem were selected to which the greater part of the study was directed. The four points:

1. The extent to which laws and regulations governing the installation of protective apparatus at the telephone substation have been made and enforced and the character and requirements of such laws and regulations.

2. A survey of the practice among Independent telephone companies in the installation of substation protective apparatus at different classes of stations.

3. The hazard which exists to property and to persons by reason of the presence and use of telephone wires and instruments both with and without substation protective apparatus.

4. The amount of trouble and interruption to service caused by the presand by its operation under conditions ence of substation protective apparatus of service.

In electrical installations of all kinds there are two hazards that must be guarded against: the hazard of fire and the hazard of personal injury to workers and to users. There have grown up two sets of rules designed to specify the manner in which installations should be made to reduce these hazards.

One of these is the National Electric Code, the rules and requirements of the National Board of Fire Underwriters for electric wiring and apparatus. The other is the National Electrical Safety Code prepared at the Bureau of Standards with the assistance and co-operation of many interested bodies.

Other rules have been adopted for use in definite localities, as in states and cities, or have been drawn up by private companies for the guidance of their own forces. In the main, the latter classes of rules conform to the two general sets of rules mentioned above, although they may go more into detail and in some respects may even have more rigid requirements.

The National Electric Code is primarily a code of rules designed to reduce fire hazard.

The National Electrical Safety Code comprises rules that constitute a rec-

ommendation for practice but are not self-enforcing.

Summary of Code Requirements

A summary of the requirements of the two codes for the installation of telephone protective apparatus is as follows:

1. Telephone stations in commercial exchanges are divided into exposed stations and unexposed stations. An unexposed station is one in which the entire circuit is run in underground conduit from the central office to the block in which the building is located and within the block is so placed that it is free from the possibility of accidental contact with electric light and power wires of over 250 volts in case of failure of supports of either set of wires. All other stations are classed as exposed.

2. At exposed stations, an approved protector is required. An approved protector must be mounted on a non-combustible base and must have all of the live parts insulated from the surface upon which it is mounted. It must consist of an arrester and a fuse in each line wire and must be so arranged that the fuses will protect the arrester. The connections to line, ground and instrument must be plainly marked.

3. The protector must be mounted as near as possible to the entrance of the wires of the circuit and must be in an accessible place. It must be located so that it is not in the vicinity of easily ignited materials and must not be exposed to inflammable gases, dust or flying materials.

4. The ground wire shall be of copper, not less than No. 18 B. & S. gauge. It must have an insulation of rubber not less than 1.32 inches thick and a substantial braid. It must be run in a straight line to the nearest point where a satisfactory ground connection can be made and where run on the outside of buildings should be protected by moulding.

5. The ground connection should be made on a water or gas pipe connected to street mains where available. If gas pipe is used, connection should be on the street side of the meter. Where water or gas pipes are not available a ground rod or pipe driven into permanently damp earth should be used. Steam or hot water pipes are not to be used for ground connections. The connection to the ground rod or pipe or to water or gas pipes must be made with an approved ground clamp or must be securely soldered.

Neither the National Electrical Code nor the National Electrical Safety Code are issued by bodies that have power under the law to enforce compliance with their provisions. With one exception, no case has come to the attention of the writer where an attempt has been made to force compliance with the telephone installation specification in either of these ways. The schedule of after-charges in force in the central states makes no mention of telephone installation.

In the case of state regulation, compliance may be required by statute or by order of some regulatory body. Public service commissions, industrial commissions and state fire marshals may have jurisdiction.

Summarizing the information regarding state regulation, it seems that two states, Wisconsin and Florida, have definite orders requiring the installation of substation protectors. The situation in Pennsylvania and Oregon is not clear, but it is apparent that if any orders are standing on the books they are not being enforced. In Illinois, Indiana, Oklahoma, North and South Dakota there are no orders or statutes. No information has been secured from other states but it is probable that most of them do not have any regulations at the present time.

Bell and Independent Practice

In regard to the Bell system, its installation practice requires a protector at each exposed station and conforms to the rules quoted above in all respects.

In the Independent field practice varies widely both in respect to the location of protective apparatus and the types installed.

Returns received from over 180 companies provided a considerable amount of information. One of the questions asked for the number of city stations protected at the cable terminal and at the station and the number of rural stations similarly protected. A total of 174 companies sent information that could be summarized. These companies operate more than 366,000 city stations and 121,000 rural or a total of over 486,000 stations.

The practically universal use of cable terminal protectors in the Independent plants is shown by the fact that 304,000 city and 108,660 rural stations are protected by some form of protector at the cable terminal or on the line. These figures represent, respectively, 83 and 90 per cent of the total numbers.

The figures for substation protectors show that 148,063 of the city stations and 84,509 of the rural stations have substation protectors. The percentages are 40 per cent and 70 per cent, respectively. A few companies report the use of knife switches without other protection at the substation on rural lines. These have been classified as unprotected since the protection depends upon the subscriber. The total number of stations of this kind is not large.

While much care must be exercised in drawing general conclusions from a study of a relatively small proportion of the total number of Independent substations, there are a number of interesting facts brought out by the figures. Independent companies in the Pacific states report that there is practically no lightning at any time during the year in those states and unless there are high voltage lines in the territory the lines are practically unexposed.

It is in the Central States where practice seems to have crystallized along the definite line of placing all protection at the cable terminal and omitting the substation protector. Ohio, Indiana, Michigan and Iowa seem to be the states where this practice is most generally followed. In Illinois it is also pretty general with the exception of a few large companies. In Wisconsin the use of the substation protector is more extensive. Several companies in that state reported that they are now installing protectors in accordance with the commission order.

The data were not in shape to make a division between common battery and local battery stations but it was quite evident that the local battery stations were reported as having substation protectors where the protectors on the subsets were used. While there are objections to the substation protector mounted on the wooden box, this much may be said in its favor—if it were not furnished with the set there would be many rural stations without protection of any kind.

The opinion has been expressed that many of the stations in districts served by underground cables are really unexposed and, therefore, do not require protection. A survey of 43 city blocks in one exchange was made and the drop wires were classified as exposed and unexposed. All drops were classified as exposed where there was possibility of contact between the drop wires and electrical supply lines of over 250 volts in case of the breaking of either wire or of complete failure of one or both pole lines.

An exception was made where total failure of the pole line would result in breaking the drop wire or in pulling it entirely off from the building so that the station would be disconnected. This seems to be a reasonable interpretation of the rule. In 8 of the 43 blocks joint construction was on separate pole lines. In 14 blocks no primary wires extended into the block and so all stations were classed as unexposed. Out of a total of 907 drop wires inspected, 459 were classified as exposed and 448 as unexposed.

Two of the three manufacturers making responses agree that the proper practice is to install an arrester mounted on a non-inflammable base at a point as near the entrance as possible, but they also agree that the pres-

ent practice of mounting the arrester on the instrument is preferable to taking a chance that it will be omitted entirely.

Among the sources of information as to the hazards created by the presence of telephone wiring on a building and to the possibilities of damage and personal injury due to the telephone installation, were the telephone companies, insurance companies and reports of state fire marshals.

Summary of Damages

The questionnaires sent to the companies contained blanks for information as to the number of cases of property damage and personal injury occurring at stations equipped with protectors and at stations without protectors. The cases were divided between those due to lightning and those due to foreign currents. The reports of 150 companies operating 411,724 telephones contained information on this point. The results may be summarized as follows:

Property damage—108 cases without protector and 98 cases with protector; personal injuries—7 cases without protector; 5 cases with protector.

An attempt was made to arrive at a figure of property damage and personal injury per station per year but only a rough approximation was possible from the figures available. The records covered periods from 1 to 28 years and no means were available to make an exact determination of the average number of stations. As a rough approximation, the average number of stations was taken as one-half of the present number. Using this approximation the reports covered a total of 2,941,213 station years. Using these figures the reports indicate one case of property damage to each 14,278 stations each year, and one personal injury case involving substation protectors to each 245,101 stations per year. Due to the character of the information on which these figures are based, they may be considerably at variance with the actual facts.

It is interesting to note that the number of cases both of property damage and personal injury where protectors are used and where they are not installed are approximately equal. It must be noted, however, that by far the greatest number of cases where protectors are reported have only the carbon protector of the type mounted on the wood box of the telephone.

Insurance Data Scanty

As far as could be learned, only one insurance company has for any considerable period of time been insuring telephone companies against personal injury to the public and against property damage. The records of this company, the Lynton T. Block Co., of St. Louis, showed only three cases in 12 years of damage or personal injury where the question of substation protection seemed to enter. Even in two of these, the question was doubtful. In the third case damage to the extent of total destruction of a house was incurred.

State Fire Marshal Data

In a number of states, the state fire marshal annually makes a report giving statistics as to the number of fires, their locations and causes. For the purposes of the study, figures from two states, Kansas and Indiana, for the year 1921 were examined. The 1921 figures for the two states follow:

	Ind.	Kans.
Total fires reported.....	4,510	3,220
Fires due to lightning.....	165	150
*Fires in buildings and places where no telephone is likely to be installed.....	115	107
Total fires due to lightning in places likely to have telephone service	50	43

*Compiled from place and property statistics.

It is evident that telephone wires can be charged with only a very small percentage of the fires in the buildings which are not set on fire by lightning and in both states less than 1.5 per cent of the total number of fires were caused by lightning in buildings where there probably was telephone service. In other words, there is nothing in these reports to indicate that an excessive number of fires can be traced to telephone wires.

Summarizing the information secured from the above sources, it seems that the property damage hazard and the personal injury hazard due to the presence of telephone wires is very small. On the other hand, it seems that when the exceptional case occurs, the probability is large that the damage or injury will be quite serious. Such would be the case of burning of a building or serious injury or death of a telephone user.

It was noted that damages and injuries reported occurred about equally at stations equipped with protectors and those not so equipped. It was further noted that the protectors in the places where damage and injury were reported were principally of the carbon and mica type mounted on the instrument itself.

Figures on Operation

One of the arguments most frequently advanced against the substation protection is the increased cost of maintenance and the interruptions to service caused by the operation of the protective apparatus. Arrangements were made to secure figures from several exchanges where records were known to exist.

Records of greater or less accuracy were obtained from 13 exchanges. These records were serviceable in furnishing the total number of cases per year requiring the visit of the trouble man to the substation because of substation protector trouble. In a total of 80,972 stations with protectors there were 5,540 cases of trouble in a year, 68.4 cases per 1,000 stations per year.

The number of cases per thousand stations per year were computed for each case as well as the averages. The averages, however, mean very little as the influence of a single exchange is too great. For instance, nearly half the stations reporting are in a single exchange. The average number of cases of trouble per thousand stations per year including this exchange is 68.4 and omitting it is 87.1. In the individual exchanges the number of cases per thousand stations per year range from 21 to 800.

One of the strong arguments made against the use of substation protectors is the interruption to service caused by the operation of the protective apparatus. An attempt was made to get information along these lines but without results. Interruptions of service come from two sources. Interruption to service caused by grounds or by open fuses and interruptions due to disconnection of one or more parties on a party line to clear the line when the party at whose station the trouble has occurred is not at home.

The Cost Factor

In determining its policy in the matter of protection of the telephone plant, there are several economic considerations that must be taken into account by the telephone company. It is unnecessary to expand here the statement that it has accepted the obligation to render a continuous and safe service at as low a price as is consistent with the maintenance of a service of high quality.

This means that the telephone company must adopt practices that will result in the production of telephone service at the least cost in the long run as long as these practices do not affect the safety and continuity of the service.

If it can be assumed that the maintenance cost is the same with unprotected terminals and individual protectors at the substations and with unprotected substations and protected terminals and that the loss due to damage of the telephone company's property is the same in the two cases, the entire problem reduces to a problem of fixed charges.

If it can be assumed further that the life of the investment of one dollar in either type of property is the same, i. e., that the depreciation rate is the

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Tells Texas Finance Plan

Originator of Financing Plan for Independents Explains Its Basis and Operations—Security of Loans an Attractive Feature—Results in Texas

By Judge S. A. Lindsey
Before Independent Annual Convention

We have in Texas 700 Independent telephone companies, operating 1,500 local exchanges and thousands of miles of toll lines, connecting and forming a complete local and long distance telephone service of excellent quality.

These properties pay gross receipt taxes upon four million dollars' earnings annually and represent a total investment of 15 million dollars.

For many years these companies have maintained a very active association by means of which, through frequent well-attended district and state meetings, their owners, officers and managers have kept abreast with the best methods of telephone construction, maintenance, operation and accounting, and learned to co-operate until today they constitute a system working within and practicing methods almost, if not quite, as uniform and up-to-date as though under one corporate supervision.

Seeing the advantage and need of adequate finance suited to the telephone business, the association asked me in August, 1922, to think out a plan of financing and submit it at the annual meeting in March, 1923. At the March meeting I reported a co-operative plan, fashioned after that of building and loan associations.

I estimated that the Independent telephone industry in Texas would require and employ continuously about 1½ million dollars to care for its credit needs in extensions and development; that the terms of credit should be long enough to allow the revenues from the investment to repay the loan from earnings resulting therefrom.

I knew that most of us get into financial trouble by using our reserves for depreciation in extensions to our plants. So I suggested that we select capable and reliable trustees, into whose hands the several telephone companies would place a monthly sum, at least equal to their depreciation; that these trustees should lend these funds to those requiring loans, upon first mortgage lien not exceeding 50 per cent of the replacement value of the plant, upon the monthly payment plan and in accordance with building and loan association methods.

The association approved the idea and appointed its president, R. B. Still of the Gulf State Telephone Co., and its secretary, L. S. Gardner of the Texas Telephone Co., to collaborate with me in working out the details. We soon discarded the trustee feature of the plan as not sufficiently practical for either assembling or lending funds and adopted a plan similar to that of federal and joint stock land banks, which is proving so highly successful. This plan does not depart from the principles of the building and loan association, but offers better means of assembling funds and more definite returns thereon.

Plan Is Functioning

The plan will be explained by relating what we are doing. We incorporated the Utilities Finance Corp. with $100,000 capital, under the laws of the state of Texas. This corporation has already completed making three loans, aggregating $44,000. When it has loaned the balance of its paid-in capital, we shall put the notes into the hands of a registrar to secure a 7 per cent first mortgage gold-bond issue equal in amount and running to maturities, with the notes forming the security, interest payable semi-annually.

These we will sell for other funds, which we shall lend, repeating the operation until we shall have loaned ten times our capital. Then we shall increase the capital and continue the operation. Federal land banks lend 20 times their capital and joint stock banks 15 times theirs, upon farms as security. Our security will be safer and better than farm land security, and our capital 1½ to two times greater.

The terms of the loans are suited to the requirements of the borrower in every detail. He repays the debt in 90 equal monthly installments, which are carefully fixed within the earnings of the plant that are safely above operating expenses. Thus the borrower is given ample time and is not burdened. The debt is growing less with every payment, so that the security, the very best at the beginning, is getting better month by month.

On first mortgages aggregating $100,000 we will issue bonds maturing as follows: $6,600 in six months, a like amount in 12, 18, 24, 30 months, and so on up to the 90th month, being 15 sets of bonds of $6,600 each, maturing at the expiration of each successive period of six months from the date of the bonds. These bonds will be retired from payments made by the borrower the preceding six months.

Some of our telephone people desire short-term bonds, say six months, some 12-month bonds, others longer, according as they may be putting aside savings for contemplated improvements. All telephone men know, or may know from the nature of the business, several years in advance of expenditures they will have to make in the up-keep of the property. Therefore, investment in these short or long-term bonds is equally suited to the plan of accumulating the reserves and other savings for replacements and extensions.

The purchaser of these bonds will furnish the funds for the loan and receive the interest paid, less the cost of operation, which will be the spread between the interest collected from the borrower and that paid to the holder of the bonds.

We have started with about the same spread as is the cost of building and loan association financing, but will narrow it as experience may justify. The Federal Land Bank of Houston, which I helped to organize and of which I am a director, operates on 1½ to 1 per cent spread, and is accumulating large reserves and paying 8 per cent annual dividends. We should be able to come to a spread of 1 per cent.

Let me ask and answer the question that is no doubt uppermost in your minds: Is the security of such sure and certain nature as to be absolutely safe?

I answer that the plan we have arranged offers the safest, and surest security I have ever known. It is safer and surer of prompt liquidation than first mortgage security upon buildings, farms or other real estate. In case of foreclosure the mortgagee can always make the security bring or yield the debt, for if he buys the property in, he makes it pay the installments out of its earnings.

Safety a Factor

It is less risky than first mortgage bonds upon any single utility, however

large the issuing concern may be, for our mortgages and bonds cover many separate going utilities, wholly independent of each other, and if one should fall, others are unaffected.

If, and as often as any borrower defaults his monthly payments, the registrar is required to return the note defaulted upon to the Utilities Finance Corp. and exact the substitution of other security in its stead, all outstanding bonds are kept safely secure.

Having, as I am sure we have, security of prime safety, outside investors will be seeking our securities by the time we have come nearly to the peak of saving funds of our own companies. Investors have bought hundreds of millions of bonds of federal and joint stock land banks, with less capital and security behind them than we offer, and bearing 2 per cent less interest than our bonds will bear; and investors are buying hundreds of millions of bonds based upon buildings and real estate security far less safe than ours, and bearing less interest rate.

I have had considerable successful experience in arranging safe and desirable securities. If these are not double safe—safeguarded as we have made and shall make them—my judgment is at fault and my experience without value.

All plants offered as security must stand two tests, namely: Is the physical value of the plant, as ascertained by our appraising engineer, worth double the amount of the loan; and have the earnings been, are they now, and in the opinion of our expert examiners will they continue to be during the period of the loan enough, over and above charges and operating expenses, to meet the monthly amortization or installment payments?

Of course, franchises and titles are examined and every objection removed before the loan is made. And where the loan goes into improvements or extensions, they are laid out by and constructed under a capable engineer of our approval. The value of our services in getting titles straight, and franchises liberalized, and extended, and in planning and supervising construction, is apparent.

Battle Creek and Marshall (Mich.) Sold to Bell

Lansing, Mich.—Orders approving the sale of the Battle Creek and Marshall Citizens Telephone Co. properties have been signed by the Michigan Public Utilities Commission. The properties will be turned over to the Michigan State Telephone Co. for the amount of their indebtedness—$500,000 in Battle Creek and $63,000 in Marshall.

Pennsylvania Plans Big State Meeting, January 10-12

Harrisburg, Pa.—Announcement of the annual meeting of the Pennsylvania State Telephone & Traffic Association has been made by President H. E. Bradley of that organization. The meeting is to be held January 10, 11 and 12 at the Penn-Harris Hotel, Harrisburg. In his announcement, President Bradley says:

"To those who attended our convention last year, it is unnecessary to speak of the interest shown in all of our meetings and the subjects which were discussed, and it would be impossible to describe the excellence of the manufacturers' exhibits.

"It is our desire to make this coming convention one of interest to all, and in order to be able to do so, we must know what subjects you most desire to hear discussed. We therefore urge upon you the necessity of writing us fully as to your wishes in this matter, setting forth those subjects which are of most interest to your company, and any other thoughts or ideas which you may have in regard to the conduct of the meetings to be held.

"All of the manufacturers who exhibited last year will again be on hand, and several others have requested space for additional exhibits.

"The fast changing conditions in the telephone industry in Pennsylvania make it necessary that we co-operate more closely with each other than ever before, and that we preserve a solid, close-working, harmonious organization for the protection of the industry as a whole. For this reason every telephone man in the state of Pennsylvania should make plans to be present at this convention and be prepared to present his thoughts and ideas as to the future, and do his part in preserving the industry on a sound money-making basis."

National Forest Sells Poles to Avoid Blight

Lynchburg, Va.—J. H. Fahrenbach, supervisor in charge of the Natural Bridge National Forest, has announced that 30,000 telephone poles have been sold from the reserve, in addition to a sale of 20,000 a short time ago. These poles are being sold in order to cut out chestnut trees now being badly attacked by the blight. The poles are to be delivered for treatment at plants of the Western Electric Company at Arcadia and Natural Bridge.

More than 2,500 different telephone directories are published for the use of Bell telephone subscribers, the editions totalling nearly 25,000,000 copies.

Illinois Annual Session

Brisk Affair Begun at Peoria—Operators' Conference and Many Exhibits Feature

Peoria, Ill.—A "harmony convention" which is bringing together here the leading lights in Bell and Independent telephone operations throughout the state, opened here at the Jefferson Hotel November 13. The meeting will occupy three days.

A record-breaking attendance and exhibits which give the state meeting the appearance of a national convention forecast a lively gathering.

Among the features on the program are:

First-Aid Exhibition—Two fivemen teams from the plant department of the Illinois Bell Telephone Co., Springfield and Peoria districts, will give an exhibition of first-aid methods on a competitive basis, Dr. R. E. Gordon, assisted by a special committee of physicians, supervising and grading the work.

Included among the addresses are:

"The Public Interest in the Public Utilities," by F. A. Stowe, editor, The Peoria Transcript; "A Medley of Statements More or Less Related to Telephone Service—Some Statistics, a Few Illustrations—and Perhaps a Smattering of Implied Suggestions," from A. R. Bone; "A Message from the Public Utilities Advertising Association," presented by W. S. Vivian; "Public Relations in Your Own Organization," an address by A. R. Patterson, and an address on "Public Utility Training Courses at Illinois," Dean C. M. Thompson, Urbana, Illinois.

A traffic conference is being held during the three-day session.

California Independents Discuss Justifiable Extensions

Los Angeles, Cal.—Members of the California Independent Telephone Association at their October meeting discussed the extension of lines to serve new subscribers in accordance with the plan approved by the state railroad commission, which calls for the subscriber paying part of the extension cost when it is too great to be justified by earnings. The California association men also discussed summer vacation rates which have not been in favor generally among the Independents. The Pacific Telephone & Telegraph Company allows a one-half vacation rate if the subscriber has had continuous service for a year, and pays the entire vacation charge for not less than one month or more than four, in advance.

Independent Veterans Meet

Big Growth Shown at Session

By Staff Correspondent

Chicago, Ill.—It can be again broadcast that the Independent Pioneers Day at Chicago was an uproarous success. The fast and furious fun of the entertainment was broadcast from the Chicago Board of Trade station WDAP so well that a Dixon (Ill.) newspaper says that even the resonant and musical voice of Louis Pitcher, manager of the Dixon home company, was heard distinctly in the cheering and laughing of the merry-makers.

Since the last meeting the Pioneers have almost doubled their membership, which now is approximately 725. In a tabulation made by Secretary J. K. Johnston, the service records of those who have been in the industry 20 years or more are divided thus:

Two hundred members between 20 and 24 years.

Thirty-five members between 25 and 29 years.

Thirty members between 30 and 34 years.

Eight members between 35 and 39 years.

Nine members between 40 and 45 years.

Two members who have served 46 years.

On the Pioneers' convention badges there are now bars which represent the length of service of their wearers. President Bradley suggested the wearing of the Pioneer badges at state conventions and to make the Pioneers prominent in state activities, the formation of state chapters, having as their chief officer a national vice-president who is active in state affairs.

H. E. Bradley again heads the Pioneers and J. K. Johnston retains the office of secretary as a result of the annual election. The executive committee consists of H. E. Bradley, Pennsylvania; J. K. Johnston, Indiana; G. W. Robinson, Minnesota; H. L. Boyer, Iowa; Walter J. Uhl, Indiana; J. G. Mitchell, Illinois; John Z. Miller, Pennsylvania; Frank A. Knapp, Ohio, and F. W. Twyman, Virginia.

In opening the first of the annual convention Pioneer Days, President Bradley recounted the progress of Independent telephony from its cradle in the four little shacks that represented the birthplace of the Independent telephone manufacturing business to the vast scope it has attained today.

The difficulty of making a definite chronicle of the growth of Independent telephony was shown in the report of H. D. Critchfield, who headed a committee appointed for this task. The committee's efforts came to naught, as its operations were limited to correspondence and a very small percentage of those requested for information responded. Mr. Critchfield recommended raising a fund which would care for the employment of a trained investigator. Through interviewing the Pioneers the data necessary is to be obtained. President Bradley endorsed the plan.

Henry A. Barnhart's address on "Pioneers" mingled the serious and the gay. He placed stress on the "red" menace, and the necessity of America for Americans. He impressed upon his hearers that it was their immediate and continuous duty to participate in civic and patriotic affairs, both as good telephone men and good Americans. In his reminiscences of his experiences in Congress he blossomed forth as a humorist of talent.

Tribute was paid to the memory of the Pioneers whose careers had ended during the year. The roster of those who had gone beyond included C. A. Ames, William M. Bailey, James A. Devore, J. A. Hudson, A. M. Howell, Nathan Heinemann and John L. W. Zietlow.

The Pioneers' luncheon and entertainment played to a capacity crowd. After the accommodations for more than 600 were utilized a big overflow hung on the outskirts and joined in the festivities. The entertainment was featured by the appearance of popular performers at broadcasting stations in Chicago.

Iowa City-Scott Telephone Co. Is Organized

Iowa City, Ia.—The Iowa City-Scott Telephone Co. has been formed to further telephone interests southeast of Iowa City. The officers are: President, John O'Leary; vice-president, Frank Grizel; secretary-treasurer, W. A. Meardon, who also constitute the board of directors.

Shelbina (Mo.) Is Placing Its Cable Underground

Shelbina, Mo.—The Shelbina Telephone Co. will, when work is completed this autumn, have about 3,000 feet of overhead cables removed and placed underground.

Kansas City Financing

Gary Company Asks Commission for Security Authorization —Officers Advised

Kansas City, Mo.—Rapid growth in the demands of the Kansas City telephone territory and the community demand that control of the consolidated Kansas City telephone properties remain with the Gary interests have resulted in the Kansas City Telephone Co. applying to the Missouri Public Utility Commission for authorization of a $6,000,000 issue of additional stock.

Several months ago the Kansas City Telephone Company filed with the commission a request to issue $6,000,000 in additional stock, to be sold to specified parties. Public sentiment registered a decided protest against the application which was interpreted generally as admitting the possibility of the Gary interests sharing control of the unified property.

The original application was withdrawn, and a new application filed on October 31 with the commission. The new application called for a $6,000,000 stock issue to be sold through the usual channels of distribution. It is said that the Gary interests have in mind a more extensive solicitation of security sales among local investors than has hitherto been conducted. No objection developed at the hearing on the application held at Kansas City, November 6, before the full commission. It is expected that the issue will be authorized in due course.

A new executive alignment in accordance with the Gary policy of rotation of officers recently was announced by the Kansas City Telephone Co.

Theodore Gary, chairman of the board, retires from that position, but retains his active status in the affairs of the organization through virtue of his office as chairman of the executive committee. Arthur F. Adams, president of the company since its formation, was advanced to chairman of the board. H. L. Gary, former first V.P. and treasurer, becomes president. The new treasurer is C. A. Bennett, former comptroller. H. L. Harris continues as V.P. Other executives who guide the destinies of the company as before are: J. G. Crane, V.P. and general manager and W. J. Kavanagh, secretary and general auditor.

Ft. Wayne (Ind.) Plant Will Be Made Automatic

Fort Wayne, Ind.—Automatic telephones will supplant all of the 22,000 phones now comprising the manual system of the Home Telephone & Telegraph Co., says Frank E. Bohn, vice-president and general manager of the company.

Independents' Code of Ethics

Adopted at 1923 Convention

Section I.—Declaration Governing Our Relations with Those from Whom We Buy:

1. Recognizing the mutual dependence existing between the operators and the manufacturers of telephone equipment, and dealers in supplies, we seek to promote the cooperation, good will and personal friendship that is the necessary basis of mutual understanding.

2. Trust and honesty are to be observed in all dealings. No misleading statements are to be made to secure lower prices, nor are the prices of competitive firms to be shown to each other.

3. The seller who quotes the lower price, other considerations of quality and service being equal, deserves the business; it is not to be given to his competitor at the same figure.

4. An order once placed and accepted is not subject to cancellation, except for a change in circumstances, and in no case because of a decline in prices or the opportunity to buy more cheaply.

5. Discounts for cash can be taken only if payment is made within the time limit specified.

6. All bills for purchases shall be paid according to specified terms of sale. If long-term payments are desired, a legitimate interest charge shall be paid for the accommodation.

7. Arbitrary adjustment of bills for any cause whatsoever without notice is unethical.

8. The purchasing agent shall not accept for himself or others any gratuity, commission, allowance, or any indirect profit in connection with any purchases.

9. As a necessary factor in the maintenance of ethical business standards with those from whom we buy, we will make an effort to give business preference to those who uphold such standards as against those who manifestly ignore them.

Section II.—Declarations Governing Our Relations with Those to Whom We Sell Service:

1. We believe in the principle of one price to all. The rules laid down by public utility commissions regarding uniformity of rates should be strictly adhered to. We believe it to be an evasion of these rules to make special reduction in rates, or to give extra service without adequate charge.

2. We recognize an obligation to render to our patrons a service that is prompt, efficient and satisfactory. If operating a non-competitive telephone system, we accept it as a duty to maintain the same high grade of service as if operating under competitive conditions.

3. We recognize our obligation to sell our service at a rate that is based upon a reasonable profit only, after the expenses of carrying on the business have been paid.

4. We recognize our obligation as public servants, to maintain a stock of supplies and spare equipment to provide properly for demands for new service, to the end that the public may be accommodated without undue delay.

5. On the basis of fair dealing, all accounts should be collected promptly. The patron who adds unnecessary expense to the collection of his accounts by delaying payment should not have an advantage over those who pay promptly.

6. Advertisements that are misleading or which do not conform to business integrity are unethical.

7. Employes who come in contact with the public should receive special instructions concerning the rules and regulations of the company, as well as instruction to be courteous, truthful and straightforward, and not to misrepresent or omit to state essential facts. The keen and the confiding buyer should be treated alike.

Section III.—Declarations Governing Our Relations with Our Employes:

1. We should manifest a reciprocal and teamwork relationship with our employes.

2. It is our duty to interest ourselves in the personal welfare of our employes, and to encourage and assist them in thrift and self-advancement.

3. Through stock-ownership, the employe as well as the employer receives a dividend on invested capital. The employe should be encouraged to own stock in the company for which he works.

4. Hiring and dismissing shall be on the basis of ability, adaptability, dependability or the lack thereof as shown in the way the employe works for the company's best interests.

5. All promotions or advancements shall be made on the basis of merit.

6. Continuity of employment shall be guaranteed for faithful work. The employer shall reward industry, loyalty, ability and unusual effort.

7. A fair wage for a fair day's work shall be the governing thought in arriving at the rate of pay for all employes, having due regard for the public's ability and willingness to pay the telephone service, the economic value of the service rendered by the employe, legal requirements, and general living conditions.

8. Employes should be instructed in the correct standards of practice in the conduct of the telephone business, so that the code of ethics of the United States Independent Telephone Association may be carried into effect by every employe.

Section IV.—Declarations Governing Our Relations with Connecting Companies:

1. The nature of our business requires that there be perfect co-operation between connecting companies and ourselves. Every effort should be made to maintain the most friendly and cordial relations.

2. It is obvious, for the mutual benefit of the companies concerned, that prompt attention be given to maintenance and repairs of individually and jointly owned toll lines.

3. Long distance operators should be carefully selected. They should be instructed to avoid disputes and delays over all toll lines.

4. It is the duty of member companies to make prompt payment of interchanged toll and other bills.

Section V.—Declarations Governing Our Relations with the Public at Large:

1. We recognize that our existence as manufacturers and telephone operators is justified only by the extent to which we can be of service to the public.

2. It is the manifest duty of all citizens to take an active interest in the welfare of the community. We assume our responsibility in supporting local, civic and commercial associations which have this as an objective.

3. It is our duty to keep informed regarding all proposed telephone legislation, and to take such action as may protect the public and ourselves against the passage of ill-advised laws.

Section VI.—Declarations Governing Our Relations with Public Regulating Bodies:

1. Between telephone companies and public regulating bodies, a spirit of mutual respect and friendly cooperation should exist at all times.

2. Responsibility for rates, rules and regulations applied for by a telephone company and authorized by the regulating body, should be assumed by the telephone company through its officers, directors and employes.

3. The service rendered by a telephone company and the relations between the company and its patrons, also between the company and its employes, should be such as to justify the regulating body in authorizing rates, rules and regulations which will yield a fair return on money invested in telephone properties.

Concluding Declarations

1. Members of this association shall seek to elevate the standards of this code, and shall use their influence and example to inspire all others in the business to do likewise.

2. Publication of this Code of Ethics by member companies in their various localities is urged.

3. The adoption of this code by the United States Independent Telephone Association places an obligation on each member to a sincere and faithful performance of the rules of conduct so set forth.

Valuation in Rate Making

Chapter XIV—Non-Physical Assets (Continued)

By Charles W. McKay, Associate Editor

The method of computing Cost of Establishing Business, as discussed in the October issue, is frequently used in connection with Public Utility cases—and especially in connection with telephone rate cases. There are numerous other methods of computing Going Value or Cost of Establishing Business—which have been used in telephone, and other utility cases. The methods most frequently used are those known as the "Metcalf-Alford Method" and the method advocated by Judge Marshall of the Supreme Court of Wisconsin.

The Metcalf-Alford Method is exceedingly complicated and we will not attempt a detailed discussion in this series of articles. It may be said, however, that the Metcalf-Alford Method relates exclusively to the "Cost of Acquiring a Given Income." It is really "a value between a tangible and an intangible value." The tangible value represents the physical property, and the intangible value refers to an estimated going value to produce certain results. In other words, in utilizing the Metcalf-Alford Method one must consider the correlation between a "comparative plant" and the existing plant. If any of the readers of this series of articles wish to review the Metcalf-Alford Method in detail, a very clear exposition thereof will be found in the Transactions of the American Society of Civil Engineers—Vol. LXXIII.

The method utilized by Judge Marshall is simpler, and it may be well to describe it briefly in the present article.

Assume that it takes a certain number of years before the gross income (for a certain telephone property) will balance a fair return upon Investment, Operating Expenses, Repairs and Depreciation. The deficit for the first year would necessarily, with reasonable interest, be carried over to the next year. The deficit at the end of that period would be added to the previous one and with interest thereon carried to the next year and so on from year to year the deficiency decreasing until finally the current income will be sufficient to balance current expenses. A state of equilibrium will then be created—the deficiency account measuring the Cost of Establishing the Business, and, therefore, the Going Value of the business.

It is necessary, of course, to make certain assumptions as to the time that would be required to produce the physical plant and to produce the present Net Earnings and present number of subscribers.

Let us refer to an illustration drawn from a specific rate case. Assume that it would require two years to reproduce the physical plant, and a year and a half to reproduce the business. With these conservative estimates as to time, it is reasonable to assume that a plant may be put into operation six months before the construction work (proper) is completed, thus allowing a period of three years (from the time the construction work is commenced) until the plant has been completed and the present earnings and number of subscribers reproduced.

The assumed progress of the construction work is shown in detail in Table I. It will be noted that although the construction period proper is completed at the end of the second year the purchase and installation of subscribers' "drops" and instruments will continue up to the end of the period for reproducing business.

Table II is assumed to be a direct copy of the Auditor's reports showing the results of operation by years. Table III shows the same items in rearranged form for the period covered by Table II and also the annual revenues and expenses per telephone as computed from the annual statement. In each case the revenue or expense per telephone is based upon the average number of telephones in service during the year.

Mr. McKay is manager of the Valuation Division of the Roberts-Pettijohn-Wood Corporation, Consulting Engineers, 646 North Michigan Avenue, Chicago, Illinois.

TABLE I.
ASSUMED PROGRESS OF CONSTRUCTION

Classification of Property—	1st Year— 1st Half	1st Year— 2nd Half	2nd Year— 1st Half	2nd Year— 2nd Half	3rd Year— 1st Half	3rd Year— 2nd Half	Total
Land	$ 2,700	.....	.....	.....	.....	.....	$ 2,700
Buildings	.....	$ 987	.....	.....	.....	.....	987
Right-of-way	.....	45,948	$ 45,948	$ 46,750	.....	.....	138,656
Pole lines	.....	14,359	19,359	20,564	.....	.....	54,282
Aerial wire	.....	.....	2,214	4,196	$ 2,914	$1,402	10,726
Drops	.....	15,000	15,078	.....	.....	.....	30,078
Aerial cable	.....	2,533	2,533	2,511	.....	.....	7,577
Subway	.....	2,907	.....	.....	.....	.....	2,907
Underground cable	.....	.....	4,339	.....	.....	.....	4,339
Subscribers' stations	.....	.....	9,749	18,473	12,829	6,179	47,230
Central office equipment	.....	.....	15,562	12,184	.....	.....	27,746
Private branch exchange equipment	.....	.....	706	.....	.....	.....	706
General equipment	5,452	.....	.....	.....	.....	.....	5,452
Paving	.....	2,394	.....	.....	.....	.....	2,394
Material and supplies	.....	.....	.....	10,959	.....	.....	10,959
Warehouse and purchasing	.....	3,762	3,762	3,761	.....	.....	11,285
Incidentals, contingencies, etc.	408	4,206	5,774	6,948*	.....	.....	17,336
Total direct construction costs	$ 8,560	$92,096	$125,024	$126,346	$15,743	$7,581	$375,350
General and legal	4,759	5,067	5,066	5,068	.....	.....	19,960
Engineering and supervision	2,681	8,043	5,362	2,681	.....	.....	18,767
Taxes and insurance	67	1,980	2,548	2,850	.....	.....	7,445
Interest during construction	241	2,089	5,768	9,892	.....	.....	17,990
Total collateral construction costs	$ 7,748	$17,179	$18,744	$20,491	.....	.....	$64,162
Total cost physical property per period	$16,308	$109,275	$143,768	$146,837	$15,743	$7,581	$439,512
Total cost physical property to date		$125,538	$269,351	$416,188	$431,931	$439,512	

NOTE—Incidentals, contingencies, etc., based on construction for 3rd year, amounting to $1,166, have been included in this item.

Table IV shows the estimated growth of the subscribers' stations and the estimated revenues and operating expenses during the period of reproducing business. It will be seen from the Table that the income per telephone is lower during the early stages of the business building period, and accordingly increases until the last half of the last year when it has reached the assumed present rate of income. Likewise the expense curve per telephone, as shown in Table IV, will be seen to be higher at the outset than at the assumed present rate which is reached at the last half of the last year. The foregoing assumptions are based upon actual experience in the telephone business. The data given in Tables I to IV inclusive forms the basis for determining the cost of establishing the business, and the actual computations are shown in Table V. The method employed in this computation, as previously stated, consists of accumulating the deficits which will occur from period to period—from the beginning of construction up to the time that the plant has gained the business. and attained the assumed present Net Earnings of the existing plant. During the first two years of the construction period no figures have been included in the return on an investment, for the simple reason that the return during that period has been covered by interest during construction period. Depreciation is the only deficit from the beginning of construction up to the beginning of operation, inasmuch as all other items during this particular period are assumed to have been included with the Collateral Construction Costs. The results of operation are shown in the item of "Net Earnings" and are obtained from Table IV. The rate of return assumed on the investment in physical property is 1.3 per cent per annum—that being the amount which practically balances the Net Earnings during the second half of the third year.

The deficits are carried forward from period to period at 6 per cent—compounded semi-annually. The results of this deficit from the beginning of the construction period amount to $44,-642.00. Deducting $1,567.00 for the taxes and fire insurance chargeable to construction during the last half of the second year (which is the over-lap of the construction and operating periods) we have, as the total cost of establishing the business, $43,075.00.

In considering the foregoing discussion—and accompanying the tables—it should be remembered that the case cited is an old one. Hence many of the assumptions may seem peculiar if viewed from the standpoint of present-day cases.

TABLE II.

REVENUE AND EXPENSE ACCOUNTS.

(From Auditor's Reports)

	1912	1913	1914
Operating income:			
Exchange service revenue	$56,324.02	$72,548.91	$75,983.39
Toll service revenue	5,420.45	8,575.37	9,084.55
Miscellaneous operating revenue	**4.45	341.44	279.27
Total telephone operating revenue	$61,740.02	$81,465.72	$85,347.21
Operating expenses:			
Current maintenance	$15,834.60	$16,846.13	$15,648.34
Depreciation	12,638.09	19,395.04	19,589.90
Traffic expense		19,037.75	19,329.18
Commercial expense	22,566.16	9,058.27	9,852.65
General expense		2,418.53	3,555.86
Total telephone operating expense	$51,038.85	$66,755.72	$67,975.93
Net telephone operating revenue	$10,701.17	$14,710.00	$17,371.28
Deductions:			
Uncollectible operating revenue		1.19	599.73
Taxes assignable to operation	676.20	1,453.27	1,392.00
Net operating income	$10,024.97	$13,255.54	$15,379.55
Non-operating revenue:			
Dividend and interest revenue	6.27	2.45	15.26
Other non-operating revenue	59.91	17.00	18.15
Total non-operating revenue	66.18	19.45	33.41
Non-operating revenue deductions		14.00	39.16
Net non-operating revenue	66.18	5.45	**5.75
Total net income	$10,091.15	$13,260.99	$15,373.80
Deductions from net income:			
Rent deductions:			
Telephone plant and equipment			172.23
Telephone offices		1,625.25	1,488.00
Other rents		855.49	191.55
Interest deductions	341.67	3,006.81	3,040.75
Total deductions from net income	341.67	5,487.55	4,892.53
Balance net income	$ 9,749.48	$ 7,773.44	$10,481.27
Number of telephones in service at end of year	4,363	4,532	4,496

**Deficit.

TABLE III.

REVENUE AND EXPENSE ACCOUNTS

(Compiled from Auditor's Reports)

	1912	1913	1914
Operating income:			
Exchange service revenue	$56,324.02	$72,548.91	$75,983.39
Toll service revenue	5,420.45	8,575.37	9,084.55
Other operating revenue	**4.45	341.44	279.27
Gross operating revenue	$61,740.02	$81,465.72	$85,347.21
Operating expenses:			
Current maintenance	$15,834.60	$16,846.13	$15,648.34
Traffic		19,037.75	19,329.18
Commercial		9,058.27	9,852.65
General	22,566.16	2,418.53	3,555.86
Uncollectible accounts		1.19	599.73
Rent		2,480.74	1,851.78
Taxes	676.20	1,453.27	1,392.00
Total operating expenses	$39,076.96	$51,295.88	$52,229.54
Net operating revenue	$22,663.06	$30,169.84	$33,117.67
Deductions:			
Depreciation	12,638.09	19,395.04	19,589.90
Net after deducting depreciation	$10,024.97	$10,774.80	$13,527.77
Interest:			
Interest paid	341.67	3,006.81	3,040.75
Interest earned	6.27	2.45	15.26
Net interest	335.40	3,004.36	3,025.49
Net after deducting interest	$ 9,689.57	$ 7,770.44	$10,502.28
Balance to apply to dividends and surplus	$ 9,689.57	$ 7,770.44	$10,502.28
Number of telephones Jan. 1	4,685	4,363	4,532
Number of telephones, average for year	4,524	4,448	4,514
Revenue and expenses per telephone:			
Gross operating revenue	$13.65	$18.32	$18.91
Total operating expense	8.64	11.53	11.57
Net operating revenue	$ 5.01	$ 6.79	$ 7.34
Depreciation	2.79	4.36	4.34
Net after deducting depreciation	$ 2.22	$ 2.43	$ 3.00

**Deficit.

TABLE IV.

GROWTH, REVENUE AND EXPENSES

During Establishment of Business

	2nd Year	3rd Year	
	2nd Half	1st Half	2nd Half
Subscribers' stations:			
Number installed at beginning of period	950	2,750	4,000
Number installed during period	1,800	1,250	602
Average number in service	1,850	3,375	4,301
Revenue and expenses:			
Gross revenue per station per annum	$ 6.00	$15.00	$19.00
Operating expense per station per annum	15.40	13.00	11.60
Depreciation	(Based on investment @ 6% per annum)		
Gross income per period	$ 5,550.00	$25,313.00	$40,860.00
Operating expense per period	14,245.00	21,938.00	24,946.00
Depreciation per period	10,283.00	12,722.00	13,072.00
Total expense per period	$24,528.00	$34,660.00	$38,018.00
Net earning per period	$18,978.00*	$ 9,347.00*	$ 2,842.00

*Deficit.

TABLE V.

COST OF ESTABLISHING BUSINESS

Period	Investment in plant at beginning of period	Investment added during period	Return on investment 1.3% per annum	Gross income	Operating expenses	Depreciation	Net earnings	Deficit per period	Total deficit to date	Interest on deficit at 6% compounded semi-annually	Total cost of establishing business per period	Total cost of establishing business to date
1st Year—												
1st Half	.....	$ 16,308				$ 245	.....	$ 245	$ 245	$ 4	$ 249	$ 249
2nd Half	$ 16,308	109,275	Construction period			2,128	.....	2,128	2,373	39	2,167	2,416
2nd Year—												
1st Half	125,538	143,768		.....	2,133	5,023	.....	8,056	10,429	192	8,248	10,664
2nd Half	269,351	146,837		5,550	14,245	10,283	18,978*	18,978	29,407	598	19,576	30,240
3rd Year—												
1st Half	416,188	15,743	2,756	25,313	21,938	12,722	9,347*	12,103	41,510	1,064	13,167	43,407
2nd Half	431,931	7,581	2,832	40,860	24,946	13,072	2,842	−10	41,500	1,245	1,235	44,642
Total	$439,512											

Less taxes and fire insurance 2nd half of 2nd year..... 1,567

Total cost of establishing business..... $43,075

*Deficit.

Relay Automatic Tells of Installations

The Editor,

"Telephone Engineer."

Sir:

On reading the August number of your excellent journal, I notice an article on "Automatic Development" by Mr. F. J. Dommerque, in which he states in relation to the "Relay System" that "There is a whole chain of relays involved in a connection and with an increasing number of subscribers the number of relays required increases rapidly. Relay systems have proved practical up to 100 or 150 subscribers. Expanding the system to a larger number of subscribers is being attempted, but its practicability has yet to be demonstrated."

We feel that Mr. Dommerque cannot be cognisant of the facts regarding the system operated under this company's patents, one of the most important features of which is that the number of relays does not increase rapidly. To extend a 1,000 line switchboard to 10,000 lines would entail an addition of approximately two relays per line only.

We would inform you that many "Relay" installations greatly exceeding the number of lines quoted have been in operation for some time, amongst which is the Public Exchange at Fleetwood, Lancashire, England, with initial equipment for 480 lines and an ultimate capacity of 920 lines. This has a group of 40 junctions outgoing to and 40 junctions incoming from Blackpool, a distance of 9 miles, besides a small number of junctions from Clevelys. The Fleetwood Exchange has no manual sections, calls demanding the attention of an operator being trunked automatically to Blackpool.

This company has also installed, or has in course of installation, some eight "Relay" Public Exchanges in India at Rawalpindi, Allahabad, Coonoor, Ootacamund, Nagpur, Poona, etc., of various sizes up to an equipment of 500 lines, with an ultimate capacity of 1,000 lines (although there is no reason why the ultimate capacity should not be many more times this amount). Coonoor and Ootacamund, which are 15 miles apart, have complete interdialling facilities, and the manual operators at Lucknow have dialling facilities to Allahabad over a trunk line of 129 miles.

With regard to Private Installations, we are just completing a Private Automatic Branch Exchange, installed by the British Post Office, in one of the big London Stores, with an initial capacity of 400 lines and an ultimate of 1,200. We are also manufacturing a similar installation, but without Public Exchange facilities, for one of the new Office Blocks in this City.

Yours faithfully,

THE RELAY AUTOMATIC TELEPHONE COMPANY, LTD.

London, Nov. 1, 1923.

R. E. Thompson Busy on Ohio Rebuilding Jobs

R. E. Thompson, manager of the Ohio Telephone Construction Co., with present headquarters at Ada, O., was among the visitors at the Chicago Telephone Convention. Mr. Thompson has handled successfully nine important telephone jobs in the past 18 months and at present is engaged in rebuilding the Ada Telephone Exchange Co.'s plants at McGuffey, Dunkirk, Lafayette, Harrod and Alger. This job embraces new equipment and new outside and underground construction. Mr. Thompson is figuring on a number of interesting contracts for the coming year. His long experience in both the Bell and Independent telephone camps stamps him as a very practical and experienced man for such work.

The City of Cleveland has more telephones than the entire continent of Africa.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

of Telephone Engineer, published monthly at Chicago, Ill., for October 1, 1923.

State of Illinois, County of Cook, ss.

Before me, a notary public, in and for the state and county aforesaid, personally appeared W. H. Graffis, who, having been duly sworn according to law, deposes and says that he is the general manager of Telephone Engineer and that the following is to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, general manager and business manager are:

Publisher, Telephone Engineer, Chicago, Ill.

Editor, Herbert Graffis, Chicago, Ill.

General Manager, W. H. Graffis, Chicago, Ill.

Business Manager, Jos. M. Graffis, Chicago, Ill.

2. That the owners are (give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders, owning or holding one percent or more of the total amount of stock):

W. H. Graffis, Herbert Graffis and Jos. M. Graffis, all of 28 E. Jackson Blvd., Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding one percent or more of total amount of bonds, mortgages, or other securities are (if there are none, so state):

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any person, association or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date above is..... (This information is required from daily publications only.)

TELEPHONE ENGINEER,
W. H. Graffis, Gen. Mgr.

Sworn to and subscribed before me this 25th day of September, 1923.

(Seal) C. A. LE ROY.

(My commission expires Oct. 4, 1926.)

Bell's Pioneers in Big Meet

Atlantic City Host to 2400

Atlantic City, N. J.—With the tenth annual meeting of the Telephone Pioneers of America, the organization evidenced such magnitude that limitation of attendance at future conventions was one of the important subjects discussed.

Twenty-four hundred Bell veterans and their guests came on five special trains, by automobile and regular trains from all parts of the continent to the assembly at Young's Million Dollar Pier.

To succeed Leonard H. Kinnard, president of the Pennsylvania Bell as head of the old-timers' organization, A. L. Salt, vice president of the Western Electric Co. was elected. Other officers elected were: senior vice president, F. A. Stevenson, director, A. T. and T. Company—Long Lines; vice president, Ben S. Read, president, The Mountain States Telephone and Telegraph Company; vice president, G. H. Dresser, general manager, New England Telephone and Telegraph Company; vice president, J. F. Naylon, superintendent of equipment—New Jersey Division, New York Telephone Company; Executive Committee, for two years, B. A. Kaiser, special representative, A. T. and T. Company to succeed B. A. Kaiser, and E. D. Nims, president, Southwestern Bell Telephone Company to succeed J. E. Warren.

Progress of the association's growth was apparent in its roster which now includes 5,836 members. In five years 16,000 Bell employees will be eligible.

Addresses were made by retiring president Kinnard, President H. B. Thayer of the Bell, Robert W. Devonshire, the oldest pioneer president (now a Bell vice-president), and others. Frank S. Routley of Kitchener, Ont., spoke of his associations with Dr. Bell during the early days of the telephone. David Houston, former secretary of the treasury, and an honorary member of the Bell Pioneers spoke in a prophetic vein. Miss Katherine Schmitt recalled early operating history in her address.

Frederick L. Rhodes, C. B. Smith, E. H. Bangs, and E. K. Hall were other Bell top-notchers whose remarks contributed to the inspiration and practical benefit of the affair. A banquet feature was the talk made by General J. J. Carty. The banquet crowd necessitated the use of four hotels.

Miss Carolyn Martin, of the Chesapeake and Potomac advertising department, in a well received address stressed the importance of Pioneers' interest in the progress of the newcomers in the industry.

A spirited entertainment schedule included a musical comedy staged by employees, dancing, swimming, and other of the routine amusements of Atlantic City.

Keystone Employees in Share-Selling Campaign

Philadelphia, Pa.—There is much friendly rivalry between various departments in the employees' organization of Keystone Telephone Co. The company is conducting an active campaign on sales of its Preference Shares of stock, and many employees are developing an expert knowledge in the fine art of security salesmanship. The recent adoption by the company of its plan of Customer and Employee Ownership has been most cordially received by the general public and by an overwhelming majority of the men and women members of the Keystone organization. Over ninety six per cent of the employees have become sharing partners in the earnings of the business through purchase of Preference Shares.

Most of the employee-shareholders have enlisted in the share-selling campaign and more than a few have shown a marked ability in this line.

The Keystone Telephone Co. has a perpetual franchise for supplying telephone service in Philadelphia; also it has franchises in other communities in Pennsylvania and New Jersey. It operates twenty-four telephone exchange buildings, has 5,710 miles of local and long-distance lines. Its underground system is one of the most complete to be found anywhere in America. It includes more than 13,000,000 feet of duct, mostly terra cotta, laid in tile.

According to the company's literature the present offering of Preference Shares will pay shareholders at the rate of 7.41 per cent on the investment. From the same source comes the statement that capital raised in the sale of these securities will be used for the retirement of present obligations and will enable the company to provide facilities for taking care of the ever-growing demand for its service.

New England Strike Cost Bell $2,000,000

Boston, Mass.—The quarterly financial statement of the New England T. and T. Co. shows a deficit of nearly $2,200,000. President M. B. Jones declares that $200,000 is due to seasonal falling off of business and vacation expenses. The part of the deficit due to the strike is placed at $2,000,000, itemized roughly as: $550,000 for withholding of business due to the strike; guarding, transporting and feeding operating forces, $950,000; and abnormal expenses for instructing new operators and otherwise restoring service, $600,000. As large as the deficit is, it would have met the demands of the striking operators for only four months.

A. T. and T. Profits Show Big Increase

New York, N. Y.—First nine months of 1923, estimated in part, and compared with the corresponding period last year, as shown by the A. T. and T. Company statement:

	1923.	1922.
Divs. rec.	$39,890,945	$33,282,388
Int. & other rev.	9,685,782	9,187,431
Tele. rev.	53,379,024	47,724,196
Total inc. ...	$102,955,751	$90,194,012
Exp. Fed. taxes, &c.	31,952,271	29,133,162
Interest	9,747,338	12,188,268
Balance	$61,256,142	$48,872,585
Dividends	46,770,739	38,499,872
Surplus	$14,485,403	$10,372,713

Earnings per share exceeded the dividend requirements by a larger margin than the average during the last ten years. During the first eight months of 1923 additions to the operating plant worth more than $150,000,000 had been made, when service was extended to more than 500,000 additional stations.

Improved Service Promised in Oklahoma Telephone Deals

Oklahoma City.—Guy Hall, formerly of Hamilton, Tex., where he managed the exchange of the Gulf States Telephone Co., of which R. B. Still, of Sherman, is head, has bought the telephone exchange at Milburn, Okla., and taken charge of its operation. The telephone exchanges at Centralia and Bluejacket have been sold by Frank Russell, of Bluejacket, to C. S. Nation, manager of the Welch Mutual Telephone Co. The new owner says the three exchanges will be put in first-class condition and operated as a tri-city circuit. Work of improving already has been begun.

State Chiefs Talk Finance

Commissions Govern Plans

Chicago, Ill.—Reversal of commission decisions by federal courts threatens the existence of the Indiana public utility commission. H. A. Barnhart, president of the Indiana state telephone association, told the annual conference of the state association executives held during the closing day of the national Independent convention. Mr. Barnhart added that many Hoosier voters thought the commission an unnecessary expense in view of the frequent reversals of its rulings, and that the issue would be an important one in the 1924 political campaign. The utilities, stated Mr. Barnhart, preferred commission control to the disturbing instability of local political control.

Discussion of commissions and their attitudes was made a prominent factor in the state executives' discussions because it was on commission approval and co-operation that the financing plans being considered for Independents depended. The Texas financing plan would bump into the rules of commissions of other states relative to the issuance of securities, so Mr. Barnhart maintained, citing the Indiana commission's attitude.

Other aspects of commission approval or veto of the Texas plan of financing were presented by G. W. Robinson, George R. Fuller, Jay Greaves and R. B. Still.

Financing occupied the center of the stage in the executives' meeting and progress was made toward the formulating of a financing plan that would care for the industry's requirements, among the most urgent of which was the supplying of capital for extensions to the smaller companies.

At the meeting of the state executives were:

F. B. Mackinnon, president, and Chas. C. Deering, secretary-treasurer, of the United States Independent Telephone Association; W. G. Brorein, president, Florida Telephone Association; C. D. Cushing, president, Vermont Telephone Association; Geo. R. Fuller, president, and J. G. Ihmsen, vice-president and general manager, Up-State Telephone Association of New York; Ernest Irwin, secretary, California Independent Telephone Association; Chas. E. Wells, president, Oregon Local Telephone Association; Jay G. Mitchell, secretary, Illinois Telephone Association; E. D. Glandon, president, Illinois Independent Toll Clearing Association; H. A. Barnhart, president, Indiana Telephone Association, Sam Tomlinson, vice-president, and Max Hosea, treasurer of the Indiana organization.

T. L. Youmans, president, and L. M. Kraege, secretary, Kansas Independent Telephone Association; W. J. Thompson, president, Maine Telephone Association; Jay Greaves, president, and J. C. Crowley, secretary-treasurer, Minnesota Telephone Association; R. W. Hedrick, secretary, and G. W. Schweer, membership secretary, Missouri Telephone Association.

G. B. Adams, vice-president, New Hampshire Telephone Association; F. L. McKinney, secretary-treasurer, Ohio Independent Telephone Association; Cameron L. Baer, secretary-treasurer, Pennsylvania State Telephone & Traffic Association; R. B. Still, president, and L. S. Gardner, secretary, Texas Independent Telephone Association; W. F. Goodrich, treasurer, Wisconsin State Telephone Association; Geo. E. Atkinson, Creston (Iowa) Mutual Telephone Co.; C. L. Ovitt, Northern Telephone Co. Enosburg Falls, Vt.; Francis Dagger, supervisor of telephone systems, Province of Ontario, Canada; H. L. Beyer, Interior Telephone Co., Grinnell, Iowa; L. Q. Trumbull, Chicago.

H. W. Hubenthal, telephone engineer, Oklahoma Utilities Association; J. A. Steninger, Steninger Telephone Co., Parker, S. D.; Harry H. Armbruster, Purcell (Okla.) Telephone Co.; L. E. Thrasher, Oklahoma-Arkansas Telephone Co., Poteau, Okla.; D. M. Neill, Red Wing, Minn.; H. F. Lueders, Norwood, Minn.; P. M. Ferguson, Mankato (Minn.) Citizens Telephone Co.

G. W. Robinson, Tri-State Telephone & Telegraph Co., St. Paul, Minn.; E. W. Lutz, Citizens Telephone Co., Circleville, Ohio; Ben Woodbury, Columbus, Ohio; F. W. Webster, South Atlantic Telephone & Telegraph Co., Miami, Fla.; Otto Wettstein, Florida Telephone Co., Orlando, Fla.; F. M. Boardman, president, Iowa Independent Telephone Association.

OUR LITERARY DIGEST

Review of Recent Articles on the Telephone and Allied Subjects

"Telephone Transmission over Long Distances," by H. S. Osborne. Journal of the American Institute of Electrical Engineers, October, 1923.

This paper is a review of some of the problems of transmission of telephone currents over long distances and a discussion of some of the more recent improvements in extremely long distance circuits. The difference between power and telephone transmission is brought out by a comparison of the frequencies involved and of the amount of power transmitted. In power transmission the tendency is toward interconnection and the development of large systems where all customers are served from the same line. In telephone transmission separate lines must be provided for each pair of talkers.

One of the most conspicuous examples of long distance transmission is the circuit between New York and San Francisco. Recent improvements have been made on this circuit by removing loading coils and doubling the number of repeaters. The circuit now delivers 70 microwatts instead of 10 microwatts at the distant end when 1,000 microwatts are transmitted into the sending end. This is made possible by the reduction of echo current effects. The frequency characteristics have also been improved.

Another important development is the use of toll cables. These are now practicable up to distances of at least 1,000 miles and new cables are being added to the Bell system at the rate of 500 miles per year. This is a sharp contrast between the 80 lbs. of copper per mile in a cable circuit with 870 lbs., in an open wire circuit. Carrier current systems have also been used extensively to provide a large number of independent channels with a moderate use of copper. Growth of traffic is requiring additional circuits and in only a few years additional transcontinental circuits will be required.

Bell Officials Confer for Ten Days at Rye Beach, N. H.

Rye Beach, N. H.—One hundred and thirty-five Bell executives met the latter part of October for a ten-day conference at Stoneligh Manor here. Mornings were devoted to business sessions, during which the executive problems of the Bell units were discussed. Afternoons were spent in golf and other sports.

Important Improvements in Alabama This Year

Birmingham, Ala.—More than 528 miles of physical copper circuit and 224 miles of phantom circuit will be added to the long distance system of the Southern Bell Telephone Co. in Alabama this year.

The city of Chicago has about the same number of telephones as the entire continent of Asia.

Three Oklahoma Plants Consolidated by C. S. Nation

Bluejacket, Okla.—The Centralia and Bluejacket telephone exchanges have been sold by Frank Russell of Bluejacket to C. S. Nation, manager of the Welch (Okla.) Mutual Telephone Co., who announces that the three exchanges will be put in good condition and a tri-city circuit formed. Work of improving the lines has begun.

Practical Plant Problems

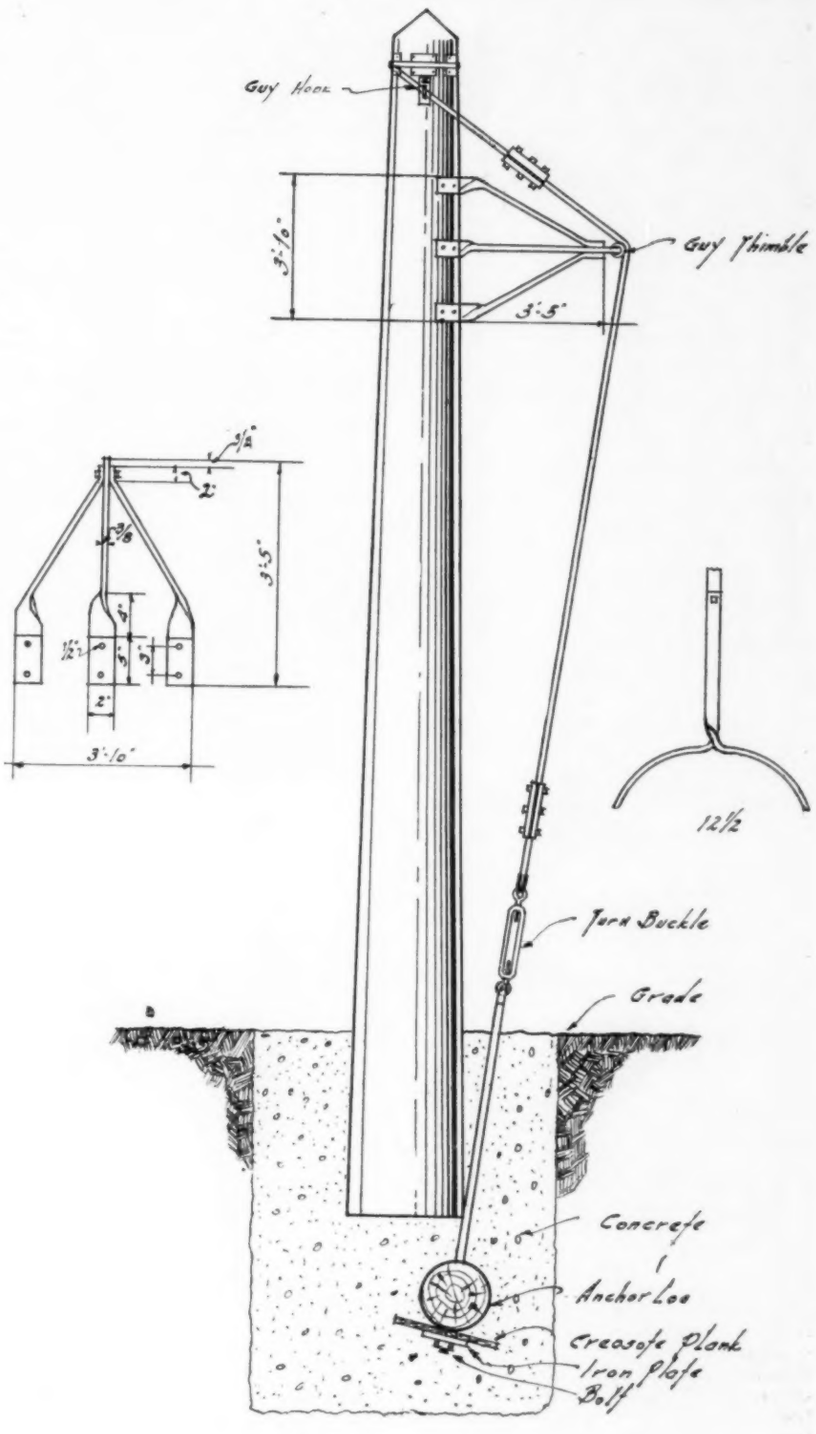
Chapter XVIII—Specifications for a "Self-Anchoring" Pole

By CHARLES W. MCKAY, Associate Editor*

In nearly every telephone property—be it large or small—occasion frequently arises necessitating the termination of an aerial cable (or a heavy open wire lead) at a point where it is difficult to provide the necessary anchorage facilities. Take, for instance, the case of a short residential street—where there are a large number of subscribers at the end furthermost from the main cable lead. It may be desirable to extend the cable to the end of the street but, for right-of-way or other reasons, it may not be possible to provide the usual anchorage facilities. The writer has known of a number of cases of this nature.

The self-anchoring pole shown in the accompanying illustration will be found especially effective in cases of this kind. It will be noted that the guy strand is carried over a specially designed fixture; the pole is set in concrete with an anchor log or "dead man" placed almost underneath the pole. The anchor is attached to the anchor log in the usual manner and the strand terminated at a turn buckle. After the anchor and strand have been placed the tension of the strand can be adjusted by means of the turnbuckle. The strand and fixture serve as an anchor and also as a reinforcing strut to the pole.

The details of this rather peculiar arrangement are clearly shown in the accompanying illustration and it is thought that no further explanation will be required. It may be said, however, that plan illustrated has been adopted in a number of plants with most satisfactory results. Of course, it will be understood that the ordinary method of anchoring a pole is preferable and that the method herein described should be used only in such cases where the ordinary anchorage facilities are not available.



Mr. McKay is Manager of the Valuation Division of The Roberts-Pettijohn-Wood Corporation, 646 North Michigan Avenue, Chicago, and Consultant on telephone engineering problems.

At the present time there are 15,000,000 poles carrying the telephone circuits of the Bell system—poles enough to build a railroad trestle from Chicago to Buenos Aires.

Exhibits, Telephone School

Industry's Progress Show in Booths

With the major manufacturers of telephone equipment all represented by comprehensive displays, many demonstrations of apparatus and supplies, and innumerable informal discussions of methods and means between sellers and users, the exhibition feature of the Independent convention registered a decided success.

No radical departures from the prevailing types of equipment made their appearance, but the constant urge to improvement was noticeable in the refinements of finish and design of several types of telephone which were shown at Chicago.

In construction equipment there was a marked readiness to adopt devices that gave tangible promises of cutting off any fraction of construction and maintenance costs. A reflection of the extensive construction work being done and planned was seen in the business booked at the construction exhibits.

Radio came in for a strong share of attention. It was quite apparent that Independent telephone men are keeping the progress of radio under close observation that they may profit from the rapid and substantial development. Efforts of the leading telephone manufacturers, who are also making radio equipment, to get telephone companies to act as active merchandizers of radio, have begun to reap a first-class harvest.

A survey of the high spots of the Independent convention exhibits:

Kellogg's Layout Impressive.

"Use Is the Test," the Kellogg slogan, had plenty of visual backing in the many photographs of Kellogg service switchboards, which adorned the walls of the big Kellogg display. The Kellogg men stated that the photographic evidence was the most extensive that could be shown by any maker of a similar type of boards. New demonstration switchboards for large and small community service also basked in the spotlight. Kellogg steel telephones exhibiting the refinements that have added to that institution's laurels, and a complete collection of standard apparatus parts also were focal points in the extensive showing. Kellogg's four new loud speaker horns were featured in the display of radio equipment with which E. E. Potter, head of that Kellogg department, stopped the show. There was a complete exhibition of Kellogg radio equipment, which included radio units, home chargers, rectigon rectifiers, etc. J. B. Edwards and J. G. Kellogg headed the array of Kellogg talent at the convention, and with them were C. M. Bowling, H. B. Dudley, R. B. Miles, Ben Woodbury, H. A. White, H. N. Faris, W. S. Fisher, H. D. Hurlbut, H. W. Hogue, J. A. Stratton, D. B. White, M. H. Croswell, R. H. Coyne, Wm. Corwine, W. S. Boze, Glanton Smith, C. M. Thompson, W. R. Kimmel, D. E. McGregor, A. B. Pogue, J. R. Spivey, F. H. Russell, C. G. Gardner, Fred Seeley, M. K. Gher, B. A. Ogden, R. K. Smith, G. D. Wolf, E. F. Potter, H. D. Currier, J. F. Tompkins, C. A. Larsson, S. A. Mounteer, A. D. Boal, C. A. Warner, C. Reese, M. A. Bellion, D. J. Gillespie, W. S. Green, G. R. Eaton, H. P. Schmidt, C. Ruge, A. Baade, E. McDonnell, A. J. Willing, C. Sparks, C. B. Camp and E. A. Bohlman.

Stromberg-Carlson Features

Stromberg-Carlson Telephone Mfg. Co. had a big force in attendance at Chicago. With W. Roy McCanne, treasurer and general manager, there were Geo. A. Scoville, sales manager; R. H. Manson, chief engineer; E. A. Hanover, purchasing agent; E. A. Reinke, asistant sales manager; W. T. Eastwood, advertising manager; C. W. Schafer, Chicago branch manager; H. T. McCaig, assistant Chicago branch manager; A. J. Roberts, Kansas City branch manager; N. W. Baldwin, Toronto manager; Messrs. J. C. Snyder, C. W. Watson, and P. Winemiller, sales engineers; J. L. Levis, engineer; J. S. Gibson, general supply department; Messrs. J. T. Barrett, W. C. Caldwell, A. B. Crawford, R. Davis, C. D. Kinne, J. D. Kratz, L. E. LaFleur, E. F. McCord, B. H. Merriman, P. D. Myers, A. B. Preble, N. W. Redman, A. M. Roberts, D. L. Rochon, E. F. Sanders, J. A. Taggart, J. R. Thompson, M. D. Wood, E. D. York, C. Pointon, J. P. Galligan, J. B. Wilkinson and E. F. Barker, sales representatives.

In the Gray Room, Stromberg-Carlson exhibited:

The Super-Service Multiple Switchboard.
No. 101 P. B. X. Switchboard.
No. 102 P. B. X. Switchboard.
No. 104-C P. B. X. Switchboard.
No. 105 Magneto Switchboard.
The No. 1 Protector Frame.
The No. 1 Cable Rack.
The No. 1156 Central Energy Wall Telephone.
The No. 986 Desk Stand.
The No. 896 Magneto Wall Telephones.

A stock of telephone construction material and a stock of telephone line supplies.

Of the above-mentioned items, the one which received the most attention from visitors was the Super-Service Multiple Switchboard which was connected with telephones and auxiliary equipment so as to be in full operating condition. Many of the visitors soon became proficient in operating the switchboard. These visitors were quick to appreciate the advantages offered by many of the 17 Super-Service Switchboard operating features. The visitors were particularly interested in the advance plugging-in feature, the ringing control feature and the flash recall feature.

Automatic Exhibits Working Section

The exhibit of Automatic Electric Co. this year had a somewhat different character from that of previous years in that the units displayed were all connected as a working whole to form a section of a complete thousand line system.

Now that the process of standardizing on automatic operation is growing fast among telephone companies, Automatic Electric Co.'s engineers realize the value of showing not only what Strowger Automatic equipment will do for each individual company, but showing just how the equipment would be arranged in the switch-room when the conversion was made.

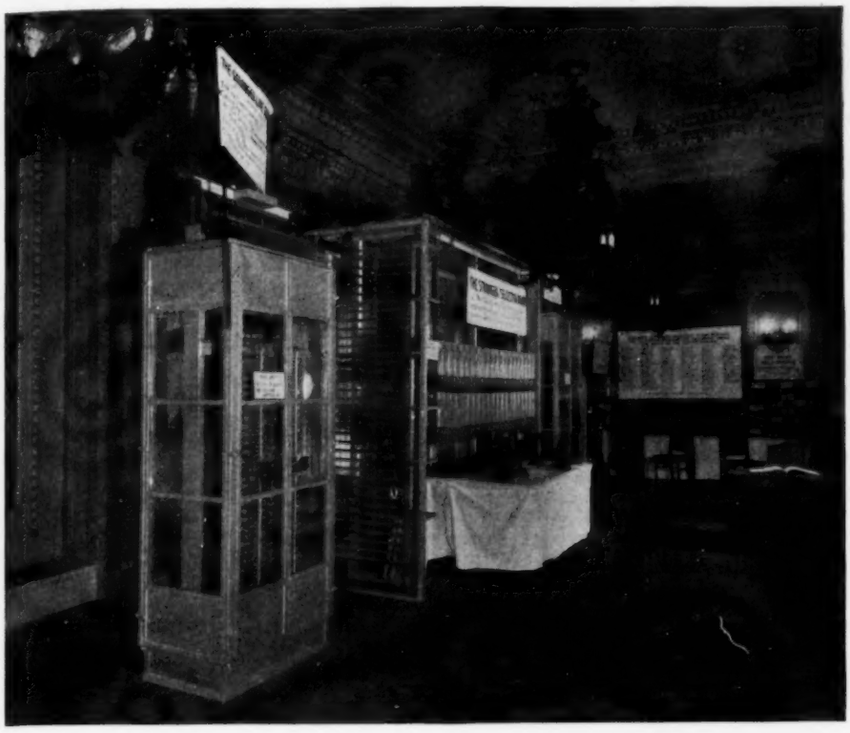
With this thought in mind three complete units were withdrawn temporarily from actual jobs in progress through the company's factory and installed in the Rose Room as a complete 200 line working exhibit. The units consisted of a 100 line plunger line switch unit, a 100 line rotary line switch unit, and a standard selector board equipped with forty selector switches mounted in two shelves of twenty.

An interesting feature of this exhibit

Stromberg-Carlson's exhibit showed the Super-service switchboard in the center, and the No. 101 *P. B. X. switchboard on the left. Back of the* 101 *is a telephone panel on which is mounted the new* 1156 *central wall telephone with concealed gongs*

was the fact announced by a card on each unit, that the units were actually en route to fill definite orders, the rotary line switch units to be installed in Lincoln, Nebraska, and the other two units in Australia. Each unit bore a placard describing its function in the operation of the whole.

To show the method of rendering various classes of service, a combination exhibit, containing both plunger and rotary line switches and various types of connectors such as individual line, party line (10 party selective), P. B. X., automatic code ring for rural lines, and reverting call switches.



A Section of Automatic Electric Company's Exhibit

The Type 21 telephone instruments, placed on the market a year ago, are still attracting great interest. They were displayed also in an attractive manner.

Representation from the Automatic organization this year was exceptionally good. Both Mr. H. A. Harris, vice-president and general manager, and H. L. Harris, vice-president, were on hand, as were representatives of the various departments.

Representing the Sales Department were: O. V. Dodge, sales manager; Roy Owens, R. H. Burfeind, and F. J. Truby, sales engineers. The telephone instrument exhibit was in charge of J. H. Finley. Other representatives present were F. G. Martin, chief engineer; F. H. Baer, assistant chief engineer; H. P. Mahoney, superintendent of installation and operation; F. C. Thompson, general superintendent; James Engh, operating department and numerous others. A register of visitors was kept. Each visitor was presented with a souvenir clothes brush.

A Well-Leiched Exhibit.

One of the continuously crowded displays was that of the Leich Electric Co. Company men at the display included O. M. Leich, A. J. Kohn, A. C. Reid, B. L. Parker, W. C. Rosenfeld, F. H. Holroyd, T. J. Gullion, J. A. Campbell, W. C. Drysdale and C. Malmborg.

The Leich magneto principle was demonstrated for the benefit of managers operating exchanges having 300 to 1,200 lines. According to the Leich organization, the installation of a Leich magneto multiple switchboard makes it possible to give the equivalent of common battery service in medium-sized exchanges without the heavy investment and change in plant telephones, etc., required on the installation of full common battery equipment.

Leich exhibited a power plant for magneto exchanges which consisted of No. 121 steel type combined ringing and charging machines. This unit operates off the power or light circuit and charges a set of 24-volt storage batteries, which in turn supply the ringing current for the exchange and the current for the operators' set, pilots, etc. Leich says this one unit is all that is necessary to furnish the energy required for the operation of a magneto plant. The great advantage in its use is that the operation of the plant is not dependent upon the lighting or power current, but the storage batteries have sufficient reserve capacity to furnish the necessary current for switchboard and ringing purposes for several days.

Leich's complete line of common battery telephones and P. B. X. switchboards had a prominent place.

Radio products of the Leich Electric Co. consisted of the "Non Tune" radio rectifier for charging storage batteries, light, comfortable headphones and jacks and plugs used in the construction of radio receiving sets.

Leich claims to be the largest manufacturer of vibrating type ringing machines in the world. Its No 7-A frequency converter is now also being put out with a steel cabinet and is widely used.

The display also included the Leich Non Tune railroad rectifier used by the railroads for charging the storage batteries operating the signals and interlocking plants along the right of way. Although it has been on the market only three years, every railroad entering Chicago now uses Non Tune rectifiers and some of them are using hundreds, the Leich company states.

French in Big Show.

Again the French Battery & Carbon Co. held open house for its multitude of customers in the telephone industry, and listened to a merry chorus of satisfied customers. The Chicago meeting was responsible for the addition of a few of the stragglers to the French coterie of customers. In addition to the French telephone batteries there also was shown Ray-O-Vac A and B batteries for radio work and the new French 641 ignition multiple battery in a metal case, which is getting a great play. J. B. Ramsay, president of the company, J. C. Ford, secretary, and G. A. Shipley, sales manager, were the general staff executives in attendance at Chicago. With them were Frank Foster, division sales manager; C. D. Boyd, radio manager; H. Doughty, Chicago manager; K. J. Helmholtz, Kansas City manager; E. A. Hallin, Indiana representative, and the famous Frank Eldridge, general sales representative.

Eversticking on the Job.

Happy Crawford was at the Everstick Anchor display officiating at the convention debut of an improved type tamping bar. An improved Blackburn triple contact cable ring also was on display, as were the well-known Everstick anchors in all sizes.

Cook on Autumn Stage

Terminals of the Cook Electric Co. line were mounted on miniature poles to make an effective educational exhibit along with the other items in the Cook array of protective equipment. The Cook exhibit was staged in an autumn setting with a leafy background to provide a note of the unusual in convention displays. On the job for the Cook people were: George R. Folds, president; John F. Jaap, E. E. Shields, C. Ruth, D. C. McKee, J. C. Bogle, J. Baker, and A. M. Wilkins.

An Exhibit with a Punch

Warner Jones and V. K. Curtis did the honors for the Carbon Products Co. The Victor 12-month guaranteed battery, which has been successfully featured by Carbon Products, was the center of the exhibit, with the Ace ignition batteries, and radio A, B and C batteries, and flashlight units also in the picture. A huge bowl of strictly legal punchless punch was served to the many visitors.

At Never Creep's Anchorage

Never Creep anchors with the Thimbleye rod, and the twin Thimbleye guy rod, gave J. J. Milligan and A. E. Ravenscroft plenty to talk about at the Chance Co. exhibit. The Never Creep's many good points were covered ably, and to fill in the gaps between Never Creep solicitations, the

Chance representatives told of the Chance combination socket wrench.

At the Coffey Service.

Jack Coffey, ably assisted by W. H. Marold and M. E. Jones, demonstrated the Coffey central accounting service. Coffey's forms and binders for class A, B and C companies also were presented by the well-known telephone accounting specialist and his aides.

Monarch's Survey.

Monarch made the convention exhibition a profitable affair. Several substantial orders for Monarch equipment were placed at the Chicago show. To let the visitors know from first-hand inspection, the attractions of the Monarch line all of the feature items of the Monarch line were displayed. The newest type common battery and magneto telephones had their first national convention showing. There were ten Monarch switchboards on display, among them being the Monarch's 45-A, 50 line; 41-C, 120 line; and the 42-C, 200 line standard magneto boards. Monarch presented to its guests a thermometer as a souvenir of the convention. In attendance at the Monarch exhibit were L. Q. Trumbull, George O. Wilson, A. L. Picot, A. W. Steinke, R. O. Palmer, V. A. Moscow, H. C. Shear, C. W. Snyder, R. C. Chock, R. C. Ridpath, F. R. Paris, and Z. A. Kimbro.

Hailing Columbia.

At the National Carbon exhibit of Gray Label Columbia dry cells, the visiting worthies were welcomed by C. W. Wilkins, Chicago district manager; his assistant, J. M. Spangler; F. Kysela, Kansas City district manager; and sales representatives R. Brooks, L. G. Drake, Bob Pullian, C. R. Howell, G. L. Stuart and Jack Harper. The ever popular Columbia cells continued to register with the convention attendants. Columbia's guests were feasted upon apples.

Page & Hill's Show.

A stage setting of "the wide open spaces" and a major note of the little red schoolhouse blended in the Page & Hill exhibit. Cedar boughs were littered ankle-deep over the Page & Hill room. To show the caution necessary in inspecting poles, the Page & Hill Company exhibited samples of usual and extraordinary defects in timbers, a display which tied up with the carefulness of that organization's inspection. Samples of Page & Hill treated poles were shown as well as photographs of the company's facilities. L. L. Hill, Buford Adams, S. G. Harris and Laurence E. Morier were the company's high-powered men at the meeting.

Simplex Jacks Displayed.

What Templeton, Kenly & Co. are doing for line construction work was shown in the space devoted to the Simplex jack display. The 329 Simplex automatic raising and lowering pole jacks, the 318 Simplex tripping type jack for pulling and replacing poles, a new type cable reel jack and automobile jacks were shown in this interesting layout. The new Simplex cable jack has ten-ton capacity. It has a T-shaped oak base and right and left-hand threading bracing which permits alignment of the jack and base under all conditions. This makes a rigid jack which will handle the heaviest reels from 36 inches to 84 inches in diameter. C. A. Crane, Jr., was in charge of the exhibit.

New Battery Shown.

A unit of a three-volt battery in one package at the cost of two individual cells was shown at the Twin Cell Dry Battery display. Attention was attracted by the unique construction. C. S. Pflasterer and F. J. Wisinger represented the makers.

Know Where You Stand with Bowdle.

The new Bowdle non-ledger system for keeping subscribers' accounts was explained by its designer, F. A. Bowdle. The simplicity of the system made a big hit with telephone men. Other items in the Bowdle exhibit were accounting forms which covered every phase of the telephone business.

American with New Feature.

One of the innovations which attracted considerable attention was the American Electric Company's new type of telephone convertible from common battery to automatic desk and wall telephones. This equipment has made a decided hit with government purchasers and big deliveries now are being made. The steel case is hinged from the back and from the container, which makes inspection and repairing very easy. Burns Express switchboards also were displayed, together with the American's telephones, testing apparatus and protective equipment. The new Burns loud-speaker was demonstrated during the convention and won hearty approval in its most substantial form—orders. P. C. Burns was in charge of the American exhibit and was ably assisted by J. J. Speed, A. A. Cronk, Eugene L. Brown, F. J. Ruhlman and E. T. Curtis.

Safety in Block System.

Lynton T. Block & Co. had its two telephone specialists, W. S. Ferguson and W. D. Jackson, making their annual appearance at Chicago and renewing acquaintance with many holders of policies in the Block liability insurance operation. The Block plan continues to grow in favor in the telephone field.

Addressograph's Exhibit.

Addressograph equipment, which is well standardized in the telephone industry, was shown in complete array from the small hand machines to motor driven automatically fed equipment. A motor driven graphotype for making Addressograph plates was on display. O. M. Caleson and R. Aitken represented the company at the booth.

Acme Card Systems Shown.

Visible indexing systems for many details of telephone company work were shown in the Acme Card System booth, which was in charge of L. E. Woolf. Among the uses for the Acme systems which were demonstrated were information service, subscribers' ledger, material purchase, pricing and inventory, cable and line records, and number record.

Anaconda Copper Represented.

F. C. Miles and C. Smith cared for the interests of the Anaconda Copper Mining Co., and held open sessions on copper telephone and tie wire.

Curran's Display Interests.

One of the features of the exhibit was the display of approximately 2,000 standard telephone forms which have been printed by the Con P. Curran Printing Co. of St. Louis. Due to the arrangement of the forms by departments and in routine order, the display had a strong educational and practical value. Curran's standard directory printing practice also afforded an opportunity for a valuable exhibit which was fully realized. Curran's experience in this work has supplied the basis for standardized and profitable directory printing and advertising solicitation. Big production's economies supplied the keynote for the Curran exhibit. Con P. Curran, president of the company, was in charge of the display. With him were Con P. Curran, Jr., vice-president; Sol Gross, vice-president and sales manager; R. M. Woolfolk, director of telephone sales; Ray Gartland, Chicago division sales manager, and W. C. Kendall and Fred Edwards, salesmen, Chicago division.

Holtzer-Cabot Prominent.

Among the interesting technical displays was that of Holtzer-Cabot telephone power plant equipment which included motors, generators, dynamotors, switchboards and interrupters. Holtzer-Cabot's display of radio equipment also excited strong interest. The Chicago office of Holtzer-Cabot had T. G. Meinema, Wm. Reid and M. E. Gault on deck at the Sherman space.

Hoosier Wire Experts Attend.

H. E. Hartman, sales manager, Indiana Steel & Wire Co., was among the line material men at the convention who could and did give expert testimony on the brisk activity of independent construction work.

North's Working Models.

To demonstrate the logic of its equipment, the North Electric Mfg. Co. utilized the sufficient and simple method of a working demonstration of its all-relay private branch exchange systems, a section of keyboard control exchange equipment and a section of dial control exchange equipment. North employs relay movements to the utmost in eliminating the step-by-step switch movements, claiming as a result a positive performance and a minimum maintenance. The efficiency of North equipment was further demonstrated in the working layout of remote control power equipment which permits operators at distant central stations to control the entire performance of their remote stations. Westinghouse Electric & Manufacturing Co. employs this North equipment exclusively in many of their power stations and railway substations. In command of the North staff at the convention was C. H. North, and with him were S. B. Ridge, sales manager; Conant Wait, manager of the P. B. X. department; H. E. Nott of the sales department, and W. E. Nichols of the engineering department.

Reliable, Per Schedule.

Wallace Cook and George Rodormer conducted their usual clinic on telephone protection and extended welcome to hosts of patients who reported recovery as a result of their treatment. Reliable's saw-tooth protectors, which were presented with the endorsement of the Underwriters' Laboratories, were very much in evidence in convention technical chatter. Self-

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same on the equipment used in either type of construction, the problem is practically one of first cost. Data are not available to support these assumptions but they are sufficient for the present purpose.

For the purpose of comparison the following prices are used:

	Protected terminal without cable stub.	Unprotected terminal without cable stub
11 pair	$14.00	$ 9.00
16 pair	19.00	11.00
25 pair	26.00	15.00
Substation protector	$1.00	
Installation cost	.75	
	$1.75	

The installation cost is based on work done when the station is being installed and includes additional labor and material. It would, obviously, not apply if protectors were installed at existing stations. The cost of an 11-pair unprotected terminal with three stations protected at the stations would be $14.25; a 16-pair terminal with 5 stations protected at the stations, $19.75, and a 26-pair terminal with 6 stations protected at the stations, $25.50. In these cases the first cost of the unprotected terminals and protected stations would be approximately the same as that of protected terminals.

If the number of stations were less than 3, 5 and 6, respectively, the unprotected terminal arrangement has the lower first cost. If the number of stations is greater than these numbers, the protected terminals have the lower first costs. If a cheaper type of unprotected terminal were used the comparison would be more favorable to the unprotected terminal arrangement. Thus an 11-pair unprotected terminal costing $4 and protectors at six stations would cost approximately the same as a protected terminal and no protection at the station.

On city lines longer than one-fourth mile to one-half mile of open wire and on rural lines, the assumption that the damage to telephone station equipment would be the same does not hold. That this damage to equipment is not negligible is proved by the amount of burned-out equipment that may be found in the store room of almost any telephone company.

Chargeable to this damage is not only the cost of the equipment destroyed but also the cost of making repairs. The amount of such damage will vary over wide limits, depending upon the type of construction, the kind of equipment in use and many other factors, and it would be an impossible task to make up any figures that would apply generally.

There is no doubt that proper protective apparatus installed at the substation will reduce the amount of loss of equipment, and here again it is necessary to balance the cost of damaged equipment plus cost of making repairs against fixed charges on station protectors plus cost of making protector repairs. That a large number of companies have found the installation of substation protectors on rural lines and the longer open wire city lines desirable from economic reasons, if for no other reason, is indicated by many of the opinions received from the field and by the fact that 70 per cent of the rural stations have protectors of some kind.

Summary of Study

The results of the present study as far as it has progressed may be summarized briefly as follows:

1. There are two general sets of rules and regulations that cover the subject of telephone substation protective apparatus. These are the National Electric Code and the National Electrical Safety Code. Other rules are in use in certain states and municipalites. Orders requiring the installation of substation protectors on exposed stations are in force in Florida and Wisconsin and in Ohio, covering certain classes of stations.

In Illinois, Indiana, Oklahoma, North Dakota and South Dakota there are no orders. In Pennsylvania and Oregon, the exact situation is somewhat in doubt. In other states no information was obtained that indicated the existence of any laws or orders.

2. Reports from 174 Independent telephone companies operating 486,375 stations in 27 states indicate that 40 per cent of the city stations reporting and 70 per cent of the rural stations reporting have substation protectors of some form. Inspections in one exchange indicate that a considerable percentage of stations in block served by underground cable may possibly be classed as unexposed under a reasonable interpretation of the rule of the National Electrical Code.

The mounting of protectors on the wood box of magneto substation sets does not conform to the rules of the code but it is unquestionable if they should be omitted until telephone companies operating this type of equipment are educated to the use of better protective apparatus.

3. Reports from 150 companies operating 411,724 stations show 108 cases of property damage at stations where no protector was used and 98 cases at stations with protectors. The same companies report 7 cases of personal injury at stations without protectors and 5 cases at stations with protectors. These reports cover a number of years ranging from 1 to 28 years for different companies.

Cases where injury or damage was reported at stations with protectors were largely stations with carbon protectors mounted directly on the telephone instrument. Records of one insurance company which insures telephone companies against property damage and public liability fail to show any considerable number of cases of this kind where the question of substation protection was involved. Statistical reports of state fire marshals failed to show the possibility of a large number of cases of fire due to telephone lines.

4. Trouble records from 14 companies failed to show any extraordinarily large amount of trouble due to operation of substation protective apparatus of modern type. No data was obtained as to the amount of interruption to service. This is a matter which will vary a great deal, depending upon local conditions and the efficiency of the maintenance department of the company. Cases where interruption to service and high cost of maintenance are claimed may be due to a poor form of protective apparatus.

Results Discussed

While the average figures given in this report apply only to the companies reporting and while it may be dangerous to draw general conclusions based on a number of stations which are approximately 10 per cent of the total number of Independent stations, yet it is thought that the figures are useful in indicating tendencies.

It is evident that a large portion of the Independent telephone companies do not favor the use of substation protectors at city stations. It is likewise apparent that the majority of them favor some kind of substation protection at rural stations and that most of them are using protection on the farm lines.

These who do not, have abandoned protection of rural stations on account of experience of high maintenance cost and large numbers of interruptions of service with types of protectors used in the past. This has created a prejudice against protection that has been removed. It seems evident that types of protection are now available which do not give excessive trouble and which actually provide the necessary protection.

A very superficial survey of the field will show that the hazard of fire or injury at the city station is rapidly becoming less, due to better types of construction and the rapidly growing use of underground cable. On the other hand, it is evident that the hazard of the rural station is being increased by the construction of rural power lines. Many of these lines are being constructed in every state and it will not be long before the rural electric light and power line is as common as the rural telephone line.

In many places these lines are being constructed by the users of the power service in somewhat the same way as mutual telephone lines were built years ago. As with the mutual telephone line, high standards of construction have not been followed and it may be expected that standards of maintenance will not be very high.

From the information obtained in the course of this study and from the

(Continued on Page 46)

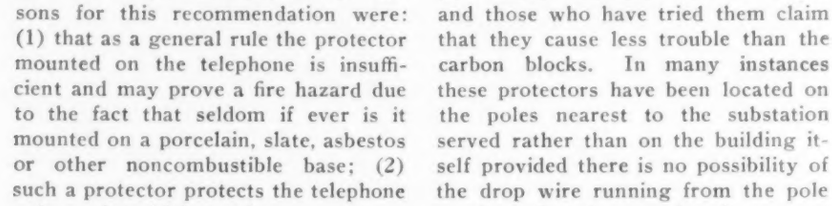
Grounding Telephone Wires

How to Insure the Best Connections Under Various Conditions —Allowable Resistances—Suggestions for Installing Grounds— Comparison of Driven Pipe and Plate Grounds—Soldering Hints

By P. Kerr Higgins

Additional Notes on Protection

It was very apparent from the interest taken in protection at the annual meeting of the Independent Telephone Association that telephone men generally are extremely anxious that some definite standard method of protecting telephone apparatus should be adopted. While many forms were mentioned and statistics given tending to prove the need of protection, nothing of a definite character was decided upon. It seems to be the unanimous verdict of all practical telephone men that the protector on the telephone instrument proper is more of a hazard than a protection. It will be remembered that a substation protector mounted on the telephone itself was described in the previous article, that it was not recommended, but rather that an individual protector unit should be installed at the point where the wires enter the house. The reasons for this recommendation were: (1) that as a general rule the protector mounted on the telephone is insufficient and may prove a fire hazard due to the fact that seldom if ever is it mounted on a porcelain, slate, asbestos or other noncombustible base; (2) such a protector protects the telephone only against high tension currents or lightning and would not protect from low tension currents; (3) such a protector would not protect damage to the inside wire which might cause a fire or other injury. While the writer suggests the standardization of method, that is, of the elements necessary for complete protection and the units necessary to accomplish this result, this does not necessarily mean standardization on any particular make of protection as many protective devices accomplish the desired result through different means and in different ways.



SUBSTATION PROTECTOR

Diagram of Standard Protection Usually Used at Entrance to Subscribers' Premises

As regards exposure to damage from foreign electrical currents and lightning discharges, substations are usually classed as "exposed" and "unexposed." Any substation, the line of which is connected to the central office through aerial cable or open wire, is considered exposed if in danger of accidental contact with foreign wires carrying high tension current or if the aerial wire extends for a distance of half a mile or more. Substations connected directly to underground cable are considered unexposed, as are those served from a terminal located on a building wall, if the terminal is connected directly to the underground system by an underground lateral cable and where the wiring is known as "wall wiring."

Experiments have been tried recently with considerable success by using metal blocks instead of carbon on all lines more than half a mile in length and those who have tried them claim that they cause less trouble than the carbon blocks. In many instances these protectors have been located on the poles nearest to the substation served rather than on the building itself provided there is no possibility of the drop wire running from the pole to the substation coming in contact with foreign lines carrying electric current.

Summarizing the above remarks it is apparent that there is a definite and urgent need for a standard system and method of protection and the time is not far distant when the protector on the substation set will be a thing of the past. A campaign of education is also urgently needed especially in the small magneto plants and rural lines to the end that the telephone subscriber may be made to realize the importance and necessity of suitable protection for his premises and against personal injury. Many rural subscribers at present seem to be satisfied with the hook joint (which interferes very much with transmission) which is disconnected with a stick or by hand when a storm appears.

Ground Wire Important

The importance of the ground wire or the connection to earth in telephone systems can scarcely be over-estimated, more especially in reference to its use at grounded sub-stations or at the central office. This is not always as well understood as it should be and the following information is given in the hope that it may be beneficial to telephone men generally and to the owners of small telephone systems in particular.

The earth is a good conductor of electricity only because of its enormous size. As a matter of fact, the conductivity of iron wire is several million times as great as the same quantity of dry earth. Hence, in order to make a good connection between earth and iron wire, the sectional area of the wire will have to be large in order to bring it into contact with a sufficient quantity of earth. Connection with gas and water pipes, buried in the earth, usually furnish a very good ground, provided the joints are not partially or wholly insulated. The reason is that these pipes usually come in contact with an immense quantity of earth. Of course, when moisture is present in the soil, its conductivity increases to many times that of dry earth.

In making ground connections for substations where gas or water pipes are available, they should be used. If they are not available, the usual practice is to use a six-foot ground rod about one-half or three-quarters inch in diameter with the ground wire soldered to the top of the rod. The writer is well aware that probably ninety-five per cent of such ground connections are not soldered, but this does not alter the fact that a soldered ground connection is infinitely better than one that is not soldered. At central offices and other important places, it is customary to bury very large metal plates in the moist earth. Copper

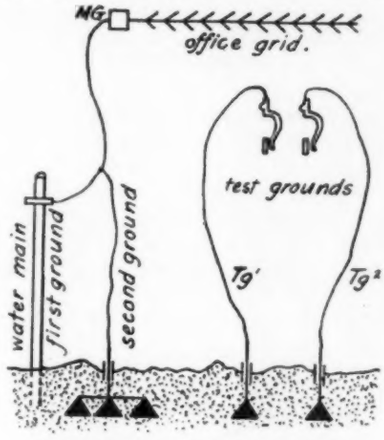
kitchen boilers or coils of wire are frequently used. When copper boilers are used, it is customary to fill them with charcoal and it is also good practice to put some charcoal and salt around the outside before refilling the hole.

In using gas pipes, the connection should be made at a point near the entrance of the pipe to the building and between that entrance and the gas meter. The best way to make the connection between the wire and the pipe is to clean thoroughly both the wire and pipe and then wrap the wire around the pipe and solder the connection in a thorough manner. Usually it will be a difficult job to solder the wire to the pipe if the pipe is filled with water. Sometimes the use of low fusing solder is practicable and alloys can be bought which will melt much below the temperature of boiling water and still make a very good joint. The pipe must be hot when soldering; otherwise the joint will not be good. Another and better way is by using a clamp which will bite into the pipe with considerable force. The ground wire is fastened under a nut and washer thus making a good connection to the clamp. Clamps of this kind are now on the market and have been found to give very good service. In view of the fact that a conductivity test of a ground is seldom made, one cannot be too careful in using his best judgment to secure the very best grounding conditions possible.

Requisites of Good Grounds

A good ground connection should and must possess a low resistance. The resistance cannot always be measured as readily as that of the line wire, unless special arrangements are made to do so. Where a low resistance ground connection is extremely important, it has been found convenient to use several grounds and connect them together at some common point. Two or more ground connections in parallel offer less resistance than that of a single ground and also provide against losing connection with the earth, due to an accident or break in one of the grounds.

The Western Union Telegraph Co. has very strict rules in regard to its ground wire connections and insists upon an inspection and test of these grounds at frequent intervals. For those interested in making tests of grounds the following issued by the Western Union Telegraph Co. is herewith submitted: "The arrangement requires two additional ground wires each entirely distinct from the main ground and having no connection whatever with the latter or with each other as shown at Tg_1 and Tg_2 in the diagram, Fig. 1. For convenience, these grounds may be run to the tips of two separate switchboard spring jacks normally open. Metal cones or plates are used for the test grounds. Grounds Tg_1 and Tg_2 may consist of a single



ARRANGEMENT OF GROUND WIRES

Fig. 1. Testing Ground

cone each buried at any convenient locality, but as far apart as possible. The measurement is usually made by the three wire method, hence it is better to obtain the additional ground circuit from separate sources."

Method of Measuring

"First measure MG and Tg_1 together by connecting the measuring leads to the posts 2_1 and 2_2 of the Western Union Standard Wheatstone bridge. Repeat the operation by reversing the leads and taking the average of two measurements for the figure to be used in obtaining final results.

"Second. Measure MG and Tg_2 in the same manner. Also measure Tg_1 and Tg_2 together.

"Then add the three average results and divide their sum by 2. From the quotient subtract the third average measurement (that of Tg_1 and Tg_2 together), which will give the resistance of MG, or the main ground, including that of its leads."

Some Suggestions for Installing Grounds

Grounds should as a rule be located so that the ground wire follows the shortest possible route to the earth. The best location is where the surrounding earth will usually be moist. Abundant vegetation usually indicates underlying moisture and favorable conditions. Where the soil is such that the surface water readily seeps away, the natural salts in the earth are dissolved and carried off, thus leaving the earth a relatively poor conducting medium. For this reason filled ground, gravel or sandy soil and in some cases a fresh water stream is not desirable for making good ground connections. The resistance of a ground connection may increase as the surrounding soil dries, even to the extent that it will be impossible to ring central. It may also be noted that ground plates or rods are sometimes corroded by chemicals in the adjacent soil and for this reason should be large enough so that they are not destroyed in a short time.

Practical observations on the resistance of grounds demonstrate that beyond a depth of a foot or two, the resistance of a grounding path provided by a rod diminishes in inverse proportion to the total length imbedded in the earth vertically. It is well to remember that the greater part of the resistance of a ground circuit lies in the soil immediately adjoining the ground conductor, contrary to the general understanding prevailing among telephone linemen. The resistance between two grounding conductors becomes practically constant when the distance between them exceeds six feet, and has then a value practically equal to the sum of the individual resistances of the conductor ground paths. The maximum fall of potential is in the immediate neighborhood of the rod and the concentration of potential increases with the dryness of the soil. Two ground rods placed close together offer very little less resistance than either alone and rods of two inch and four inch diameter show also a very small percentage of difference in ground resistance.

In order to reduce the inductance of grounding circuits to a minimum, angles and loops should be avoided, especially when used in connection with protectors. High frequency currents are practically confined to the surface layers of conductors in which they flow. This is known as the "skin effect" and it follows that a metallic

EXAMPLE

Resistance of M G and Tg^1 equals 4.70 ohms.
Resistance of M G and Tg^2 equals 6.25 ohms.
Resistance of Tg^1 and Tg^2 equals 10.80 ohms.
Adding: 4.70 plus 6.25, plus 10.80 equals 21.75 ohms.
Dividing 21.75 by 2 equals 10.875 ohms.
Subtracting 10.80 (the resistance of Tg^1 and Tg^2) from 10.875 equals 0.075 ohms, which is the resistance of M G, including its leads.

ALLOWABLE RESISTANCES FOR GROUNDING

The following values are suggested as allowable resistances for ground connections:

Central office grounds	0.1 ohm
Substation grounds	5 ohms
Lightning arresters	15 ohms
High potential protectors	25 ohms
Aerial cable grounds	50 to 100 ohms

tube offers about the same impedance to high frequency current as a solid conductor of the same periphery. Minimum inductance and weight of material are alike secured by the use

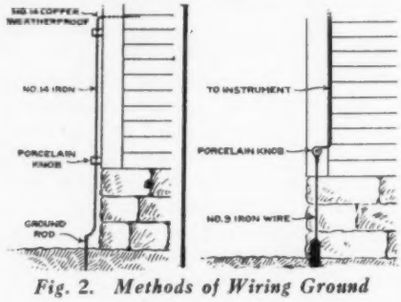


Fig. 2. Methods of Wiring Ground

of separate ground wires in parallel. Iron wire offers considerable impedance owing to its magnetic nature. If galvanized, its impedance to high frequency currents is much less. Copper wire offers minimum impedance and has the advantage of durability. Two methods of wiring ground connections to driven rods are shown in Fig. 2.

Driven Pipe and Plate Grounds

The resistance of a water-pipe ground usually averages about 0.25 ohms. A comparison with the resistance of driven pipe grounds and plate grounds may be made from the following table, taken from Bureau of Standards Technological Paper No. 108:

Soil—	Ave. Resist.	Min. Resist.	Max. Resist.
Fills, and ground containing more or less refuse, such as ashes, cinders and brine waste	14	3.5	41
Clay, shale, adobe, gumbo, loam and slightly sandy loam with no stones or gravel	20	2.0	98
Clay, adobe, gumbo and loam mixed with varying proportions of sand, gravel and stones	93	6.0	800
Gravel, sand and stones with little or no clay or loam	554	35.0	2700

From these measurements it is readily seen that except in certain localities where natural conditions are particularly favorable toward making ground connections with driven pipes, rods or plates to obtain a degree of safety equal to that obtained with water pipes would entail an expense that is almost prohibitive. It is possible, of course, to obtain an appreciable degree of protection and service with driven ground rods or pipes in most places, but the comparative advantages of connections with water pipes are so great that the latter should be used wherever possible.

Soldering Hints Worth Remembering

The ability to do a good job of soldering has come to be one of the primary tests of a repair man's ability, just as construction work is judged by the manner in which the corners are built. Regardless of how familiar he may be with circuits or how expert he has become in testing and locating trouble, he will always be a back number unless he is expert in the use of the soldering copper. It is useless to try to solder any heavy object with a small copper, as the heat generated will be deflected and radiated away from the copper so rapidly, after heating, that it becomes too cold to work with and properly unite the parts. A cold copper causes the workman to smear the solder on by the tip of the copper, instead of holding the copper on to the work to be done until the solder is hot enough to flow smoothly into place. A sample of this is shown in the diagram, Fig. 3, of a good joint and a poor joint and a poorly soldered joint or connection is

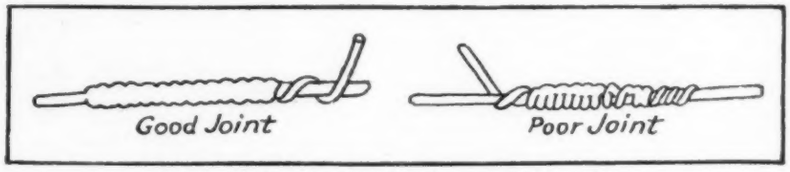


Fig. 3. Illustrating Good and Poor Soldered Joints

the bugbear of every telephone trouble man. "An ounce of prevention is worth a pound of cure" should be the motto of every telephone trouble man and if lived up to would eliminate a very large per cent of intermittent trouble which is always hard to locate.

The soldering tool must be kept clean and well tinned. The writer has seen a rather unique method of keeping the iron hot and at the same time safe. The device used was an ordinary soft burned brick that had a hole scooped out of one end. This seemingly rather crude device enabled the iron to be laid on the stand in such a manner that the soldering tip was imbedded in the cavity of the brick and rested in a bath of molten solder and resin (resin-core solder). In this manner the repairman always was able to keep his copper tinned and bright and ready for use. The brick seemed to radiate enough heat to keep the iron from becoming too hot and, in the case of an electric soldering iron, to save the heating coil from being burned out.

Not only must the soldering iron be cleaned and well tinned, but the article to be soldered must be in the same condition. Sandpaper will remove ordinary every-day dirt, and ammonia will remove grease from articles to be soldered. When soldering copper to copper the best solder to be used is resin core, being careful to see that it is thoroughly melted and flows freely before taking off the soldering iron. In soldering copper to iron, some form of good flux should be used. An electric soldering iron is extremely convenient and, in the hands of a careful man who knows what he is doing, is by far the most efficient tool for this work that can be obtained. However, the writer has had some very unpleasant experiences with managers at small exchanges who have been careless in leaving electric soldering irons connected up to the power circuit sometimes as long as twenty-four hours at a time. The result was not only a waste of power, but in one particular case two soldering irons were ruined in one year. It might be suggested in this connection that owners of small plants who are complaining of very high electric light bills might do worse than hide all electric soldering irons for a month or two and note the result.

Soldering irons cannot be properly heated unless held into the blue flame of the fire. The yellow flame has a minimum quantity of heat units and, what is worse still, covers the soldering copper with soot. In heating the iron, it is well to so arrange the copper in the stove that the blue flame is concentrated on the large end of the iron. The heat will flow into the tip which is beyond the flame and at the same time the tip will be kept clean and ready for use. To test the iron so as to know when it is heated, observe the flame and note when it is turned into a greenish yellow color; also, note that the color of the copper changes rapidly. The heat of the copper can be further tested by touching the point of the copper with a piece of string solder. If this solder melts instantly, then the copper is ready for use.

How to Make Fluxes

A good flux for rough work can be made by pouring ordinary muriatic acid on scraps of zinc and allowing the liquid to stand until it ceases to bubble, when it may be placed in a bottle ready for use. Another flux may be made of alcohol two ounces, glycerine two ounces, chloride of zinc one-half ounce, and thoroughly mixed.

Multiplying Man-power

To the man with pick and shovel the digging of holes for telephone poles is a slow and arduous task. Under favorable soil conditions three to five holes are for him an average day's work. Under adverse conditions perhaps he can account for only one. When the hole is dug, eight or ten men are required to raise the pole with pikes.

But the hole-borer with derrick attached, operated by only three men, can erect as many as eighty poles in a day—releasing for other telephone work upwards of forty men.

Hundreds of devices to quicken telephone construction, to increase its safety to the employee, and to effect economies are being utilized in the Bell System. Experiments are constantly being made to find the better and the shorter way to do a given job. Each tool invented for the industry must be developed to perfection.

In the aggregate these devices to multiply man-power mean an enormous yearly saving of time, labor and money throughout the whole Bell System. Without them telephone service would be rendered neither as promptly, as efficiently nor as economically as it is to-day.

"BELL SYSTEM"

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service

This latter flux is not as strong in its action as the muriatic acid, but the muriatic acid is sometimes found necessary on iron line work. After the joint has been thoroughly soldered, it should be wiped with powdered baking soda. This will prevent corrosion taking place at some later time.

A soldering tool is never made of iron, as iron will not hold the heat long enough. It is most useful when of a weight as heavy as can be used without getting in the way of other things. The heavier the copper the longer it will retain heat. This, of course, does not apply to electric soldering irons, as in this case the iron or tip can be made small as the heat is applied to it as found necessary. If the copper is overheated, then the tinning will be burned off and it must be again tinned, which is done by cleaning the tip of the copper on all sides with a fine file and rubbing the copper on sal-ammoniac and then applying plain solder. In some cases, instead of using a file, it has been found convenient to rub the iron on a clean brick, or on sand paper or emery cloth, the object of this process being to clean and brighten the copper so that it may be retinned. If a flux is used instead of a sal-ammoniac, it can be applied with a stick or brush or the end of the solder to the parts to be soldered. A piece of wire copper about one-half by one-quarter by four inches is found very suitable for a small iron. The handles may be made of an iron rod twelve to sixteen inches long with wooden holders.

Special Soldering Coppers

Some telephone men use a flat point with a groove in the tip for wire being soldered, but this is altogether unnecessary. The pointed irons have the size of the point made to meet conditions. Each one can hammer the copper into the shape he finds most convenient. If too large a copper is used, there is danger of burning insulation or tinsel on adjacent connections or the tinsel on cord tips. Many trouble men and installers take great pride in their soldering coppers and have several, each one shaped to meet special working conditions. The most popular size is the one and one-half pound copper. As soldering coppers are sold in pairs, this means that a single copper of this rating actually weighs ¾ of a pound. A very popular form of copper is one in which the end is bent approximately at a right angle to the body, and the tip flattened out so as to permit it to be inserted freely between terminals or jacks.

Wherever possible to do so, hold the hot soldering copper underneath the article to be soldered, always remembering that the parts or article to be soldered must be hotter than the melting point of the solder. When the solder flows freely, take away the soldering iron and let the article cool off. If too much solder has been put on the joint, slight tapping while the solder is still hot will take off the surplus solder and leave a clean, good-looking connection. In using resin-core wire solder which is deservedly popular, one cannot be too careful to see that the copper is at the proper heat and that the solder flows freely; otherwise, he will have one of those well known and frequently met telephone bug-a-boos known as "resin joints" which are a prolific source of cutout troubles. Resin joints will never exist if men will use properly heated and tinned irons and observe that the parts to be soldered are thoroughly clean and bright and that the soldering copper is held on the article being soldered until the solder flows freely and smoothly.

		Parts		Parts		Parts
1.	Hard solder	2	bismuth	4	lead	3 tin
2.	Soft solder	1	bismuth	1	lead	2 tin
3.	Hard plumbers'			1	lead	2 tin
4.	Soft plumbers'			3	lead	1 tin
5.	Hard spelter (for copper iron)			2	copper	1 zinc
6.	Soft spelter (for brass, etc.)			1	copper	1 zinc
		or		1½	copper	6 zinc
7.	Common solder	1	tin	1	lead	
8.	Pewters soft solder (for lead)	2	bismuth	4	lead	3 tin
9.	Pewters common solder	1	bismuth	1	lead	2 tin
10.	Pewters solder fusing at 320° F.	8	bismuth	4	lead	4 tin
11.	Pewters solder fusing at 202° F.	8	bismuth	3	lead	5 tin
12.	Wiping solder	½ and ½ (lead and solder)				

Good Soldering Preparations

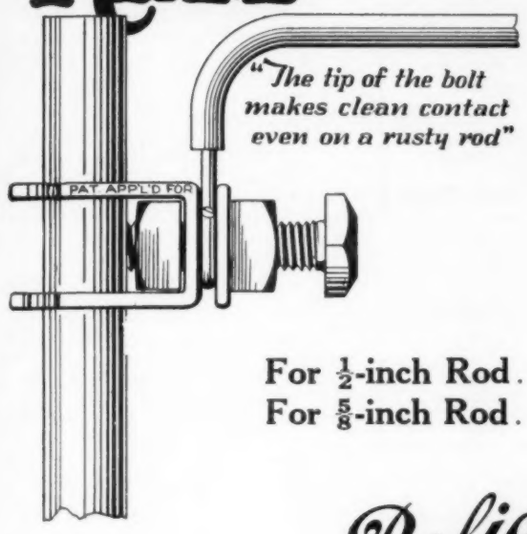
There are many soldering pastes, sticks, compounds, etc., on the market. Several of these have been found very useful and practical, while a great many are absolutely worthless. Solder may be had in many forms, such as pigs, bars, strips and in the form of wire of different sizes and weight. A good paste flux can be made by mixing one ounce of chemically pure chloride of zinc with half a pound of vaseline. Canadian Balsam may be used in place of the vaseline. First melt the vaseline or balsam and then add the zinc, mixing it with the hot vaseline and stirring the mixture until it cools, apply as in other cases where paste is used. Good results cannot be expected in soldering untinned metals with resin only, hence it is unwise to use untinned copper wire in connection with telephone apparatus, as it is our opinion that no other flux has been discovered which serves its purpose better. However, for soldering untinned surfaces, it is sometimes found to be necessary to use a chloride of zinc solution with glycerine and alcohol, as it is easily applied, remains in place and causes the solder to flow freely. But useful as this flux may be, it is found preferable not to use it on telephone apparatus. If the parts or apparatus after soldering can be washed before being assembled into the apparatus, then this might be the exception where acid or alkaline fluxes may be permitted. When copper is soldered to iron, resin must be used if possible. If any other flux is used, the joints should be washed to clean off the acid. In soldering it is imperative that all surfaces be scrupulously clean. Unannealed wires must be soldered at as low a temperature as possible. Good solder is known by its emitting the peculiar "tin sound" on bending a stick of solder. It must have an affinity for the metals to be joined and be more fusible. Solder is of two kinds, hard and soft, according as its fusibility is high or low. The following table gives some of the composition in common telephone practice:

Soldering Heavy Grounds

The soldering of a heavy wire on a half inch ground rod usually presents some difficulties, whether the rod be plain or galvanized. The following method has been used successfully and is given here, as it may prove helpful in doing this work:

The wire to be fastened to the ground rod may be either of steel or copper, but not smaller than No. 14 gauge (0.80 inch diameter). Place the top end of each rod to be wired in a fire hot enough to heat the rod red hot. This may be a blow torch, coal stove or a forge. Heat the rod red hot for about one foot from the top end. Scrape the heated portion quickly with a file and wrap the wire upon the rod. In making this wrap see that the end of the wire is first laid lengthwise against the rod and each turn thereafter wrapped around both the rod and the stationery end of the wire itself. The wrapping proceeds away from the top end of the rod. When not fewer than twelve turns have been made the original end of the wire and the main length adjoining the last turn are twisted together. All this time the wire is becoming heated. Bending the wire down along the rod out of the way, the heated joint is laid in a box of granulated sal-ammoniac and the entire joint is rolled in that

KLING KLAMP FOR GROUND RODS



WHY *MONKEY* WITH SOLDERED RODS?

For ½-inch Rod.....15c each
For ⅝-inch Rod.....18c each

Quantity Discounts
100 lots—10%
1000 lots—20%

Reliable Electric Company
3145 Carroll Avenue, CHICAGO, U. S. A.

solution. Dense, white fumes will rise, and when a stick of solder is held against the rod, it will melt in a pool in the sal-ammoniac. As the joint is rolled in this melted solder, the sal-ammoniac cleans the wire and the rod and the solder flows smoothly and evenly on both. As soon as all the space between the turns of the wire seems smoothly filled with solder the joint may be shaken to free it from superfluous metal, and allowed to cool. It does no harm to allow it to cool quickly in water and by so doing any excess of sal-ammoniac is washed away and both wire and rod prevented from corroding from that cause.

Newspaper Enlightens Commission Official on Utility Publicity

New York, N. Y.—Under the head, "Does Advertising Pay? Ask the N. Y. Telephone Company," the New York Telegram prints some interesting and instructive paragraphs on telephone company advertising. The newspaper editorial says:

"It is almost unbelievable that any person of ordinary common sense can be found who discounts the value of advertising an article or a service because the producer has what is commonly called a "monopoly." And yet we have been told that a high public official connected with the State Administration of Utilities has made this contention and has warned the New York Telephone Company and the American Telegraph & Telephone Company that they are wasting their substance when it is expended for publicity. These corporations are without rivals; there is no danger of other corporations coming in and robbing them of their business. Why, then, asks this profound economist, should the wares be advertised?

"If the official duties of this public servant are performed with no more regard for the tenets of common sense than is indicated by his protest to the telephone companies, then the people certainly are unlucky to have him in their employ.

"The primary object of a corporation is profit. Annual or semi-annual or quarterly dividends are what a corporation depends upon to keep it going. Service also is an object when the corporation is rightly conducted, and certainly the greater the volume of profit the greater the opportunity for service.

"Suppose the New York Telephone Company is a monopoly. Does not its business depend for gains upon the popularity of the telephone in business houses and in private residences?

"Only a day or two ago the telephone company urged the business world to make more general use of the long distance calls in prosecuting salesmanship campaigns. The long distance revenue is no mean item in the total receipts of the corporation. Let us presume it is 1 per cent and that an advertising campaign could double it. Would anybody, outside a public utilities rendezvous for "experts," question the value of advertising?

"But, as a matter of fact, the telephone has no monopoly. It is beset with competitors. The telegraph is a competitor, and in long distance traffic the railroad is a competitor. Not a few business men still take long distance trips at great relative expense, trips that might be avoided if they were educated to the use of long-distance wires. How else are they to be educated than by advertising?

"According to a statement recently issued, 5,500,000 telephone messages pass through the New York City central offices daily. Monopoly or no monopoly, a concern giving service to that many people must deliver satisfactory goods, must have the confidence of the public. The public could materially reduce its revenues if in unfriendly temper."

(Continued from Page 36)

cleaning saw-tooth protection now is available to the industry without any change in fuse types, due to the extensive line of protectors Reliable is making.

Runzel-Lenz Goes Strong.

Runzel-Lenz did a big business in cords at the convention, the R-L switchboard cords coming in for an especially strong demand. There was a thorough display of the Runzel-Lenz products including telephone and switchboard cords, central office operators' cords, radio cords, and cable for switchboards and interior installations. Mayo Lenz, who is secretary-treasurer and general manager of the company, H. F. Racine, sales manager, and Phil C. Lenz, sales engineer, were hosts at the display.

Unique Torches at First Show

For the first time Unique kerosene and gasoline blow torches were shown at a national telephone convention. Demonstrations of these popular torches were made by A. A. Seibert and E. E. Goller.

Prest-O-Lite's New Device

A new melting pot for lead and paraffin to be used with Prest-O-Lite gas was one of the very interesting details in the Prest-O-Lite exhibit. This practical and handy new appliance marks a further extension of the field for Prest-O-Lite in the telephone industry which already has placed its emphatic stamp of approval on Prest-O-Lite linemen's soldering outfits, torches and flare lamps for night work. J. A. O'Donnell, manager of Prest-O-Lite's small tank sales department; H. T. McGill, Chicago district sales manager; Walter L. Clarke, sales representative, and E. J. Rork were the Prest-O-Lite's own staff members present and were aided by F. C. Giblin of the Bradburn-Schmitt Co., Chicago agents for Prest-O-Lite.

Standard Underground Present

A. A. Anderson, manager of the Pittsburgh sales office of the Standard Underground Cable Company, and W. M. Rogers, J. J. Hohman and H. K. Weld of the Chicago office of the Standard, were active at the Chicago exhibit keeping in touch with the many users of Standard telephone wires and cables, and promoting the steady flow of new business that features Standard's convention operations.

Naugle's Plant Inspected

Naugle's Chicago yards were visited by many of the convention attendants who made use of this opportunity to inspect a modern pole yard and its facilities for treating poles and handling orders rapidly. At the Naugle convention display samples of Naugle-treated poles were shown, as were photographs of the company's plants. The company was represented by A. J. Naugle, E. E. Naugle, J. B. Naugle, W. G. Frostenson, A. A. Marrs, H. W. Mitchell, H. C. Stephens and E. T. Erickson.

Hurrah for Harrah

The Harrah Mfg. Co. received a glad hand from many construction men whose work had been facilitated by the employment of the Harrah Handyman Jacks and its one-man tool for stretching guy wires, messengers and cables and straightening and pulling poles. P. J. Harrah, president, and C. P. Harrah, secretary and treasurer, were at the booth.

Charles W. McKay
Consulting Telephone Engineer
Valuations — Rate Cases — Plant Problems
Manager, Valuation Division
The Roberts-Pettijohn-Wood Corporation
646 North Michigan Ave., Chicago, Ill.

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies.
J. G. Wray, Fellow A. I. E. E.
Cyrus G. Hill
1217 First National Bank Bldg., Chicago

Valuations—Supervision—Plant—Inductive Interference—Expert Administrative Counsel for Utilities
JAY G. MITCHELL
TELEPHONE ENGINEER
Member A. I. E. E.
1042 W. Monroe St. Springfield, Ill.

TELEPHONE ACCOUNTING
"COFFEY SYSTEM"
The Independent Standard
Coffey System and Audit Co., C. P. A.
118 E. New York Street, Indianapolis, Ind.
Exclusive Telephone Accountants

Ohio Telephone Construction Co.
R. E. THOMPSON, Manager
ADA, OHIO
Outside Plant and Underground Construction
Plant Engineering, Aerial and Underground Cable Construction (Burying of Cable), Switchboards, Main Frame and Power Boards and Clearing of Cable Troubles.
References, and List of Exchanges we have built, will be furnished on request.

WANTED POSITION
By a reliable, competent telephone man as Plant or Appraisal Engineer or Supt. of Plant or Construction. Can handle men effectively. Best of references.
Address: Box 120, care of TELEPHONE ENGINEER, Chicago.

ENGINEERS FOR TELEPHONE EQUIPMENT WORK
The telephone business has grown tremendously during the past year and the end is nowhere in sight. A real future is offered to men who are interested in permanent work.
Technical men, as well as those who are capable of becoming engineers, will find it to their advantage to write
R. T. Barker
WESTERN ELECTRIC CO., INC.
Hawthorne Station Chicago, Illinois

J. K. Johnston Shows 'Em

An interesting exhibit of telephone appraisal and engineering work was made by J. K. Johnston of Indianapolis, whose activities as a telephone engineer have made him a well-known figure in the telephone industry. Johnston's host of friends made his exhibit their parking space with no limitations on the time.

Herbst Construction Show

Paul Herbst had one of the most complete displays of line construction tools that ever has been made at recent conventions. His exhibit contained a big collection of linemen's equipment and tools for line and cable work.

A Storage Battery Showing

M. McCall, J. A. Fitts and D. J. Malpede were at the Electric Storage Battery's display where there was always a crowd interested in viewing the installation of Electric Storage Batteries for a common battery exchange.

Radio Merchandising

Telephone men were keenly interested in the co-operative marketing plan presentd to them by C. R. Stanley, who presented the Cutting & Washington Radio Corp., Minneapolis. The Cutting & Washington merchandising scheme arranges for a close tie-up with telephone companies whereby the latter can capitalize their standing as experts on all phases of telephony. The company's No. 11-A receiver, and its portable receiver were on display.

Texas Holds Quarterly District Meeting at Fort Worth

Fort Worth, Texas.—About fifty executives of Texas Independent telephone companies attended the quarterly district meeting of the Texas Independent Telephone Association held here Oct. 17. George McQuaid of Dallas spoke on "The Utility Company and the Public," commenting on the public's expectation that the utility operate practically at cost because of its essential public service. Practical addresses were made by F. W. Gerber of Brownwood on "Standard Practice," and E. R. Evens of Waco, on "Uniform Operating Practices." President Still told of the Texas financing plan. C. A. Shock had as the subject of his remark, "Luck." An address on "Service, and the Rewards and Happiness It Brings," was made by John W. Pace of Haskell.

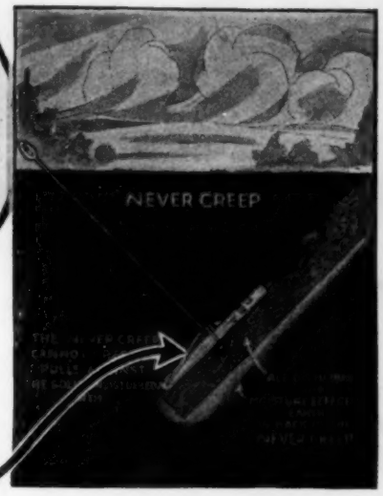
Canada's Telephones

Ottawa, Can.—There were 10.53 telephones per 100 population in Canada in 1922. The dominion in this respect ranks second to the United States. The ranking of the provinces in telephone distribution per 100 population:

British Columbia	15.19
Ontario	13.59
Saskatchewan	12.24
Alberta	10.89
Manitoba	10.78
New Brunswick	6.96
Nova Scotia	6.87
Quebec	6.58
Prince Edward Island	5.80

33% greater strength here

300% greater traverse strength here



NEVERCREEP

the anchor that outlasts the line

The NEVER CREEP anchor plate has a 300% greater traverse strength than any other anchor.

The THIMBLEYE rod—not used on any other anchor and cannot be purchased at any price for use with other anchors—has 33% greater strength than threaded rods, as are used on all other anchors. This THIMBLEYE Rod is the Greatest Improvement that has ever been made on a guy rod.

There is only a slight difference in the cost of a NEVER CREEP and the cost of other anchors that are questionable in their holding power—Buy the NEVER CREEP—the Anchor with the 100% Holding Power—and you will save money in the end.

A stock of NEVER CREEPS in every principal city.

Ask your Jobber

CHANCE COMPANY
CENTRALIA, MO.

BARTLETT TREE TRIMMERS

Are Tremendously Efficient

They are noted for their easy-cutting qualities and are guaranteed to quickly trim those overhanging, interfering branches.

Our No. 1 Rope Pull Trimmer possesses the insulating feature—as it is operated by a rope. Ten feet of rope furnished with each trimmer and two 4-foot sections to lengthen main 8-foot pole to either 12 or 16 foot length.

No. 1 Trimmer has compound lever head and is made with hook and side lever. Doubly strong and durable.

You need a Bartlett, of course. Get our prices promptly.

Bartlett Mfg. Co.
452 East Lafayette Avenue
DETROIT MICHIGAN

All Kinds of Printed Forms for Telephone Companies

Monthly Audits
General Accounting Systems Installed

Simplified Accounting for Small Companies

Every State in U. S. represented among our satisfied customers.

Bowdle Accounting System
CERRO GORDO, ILL.

(Continued from Page 37)

opinions of telephone men generally, it seems that the probability is very slight that the subscriber's premises or person will suffer injury due to the telephone installation. For this reason the practice of installing substation protection must be regarded as insurance against such damage rather than as an operating necessity. The important matter is not that damage is likely to occur but that, in the exceptional case when damage does occur, it is likely to be a very serious matter.

As a result of this study the following recommendations are made for consideration by the convention:

1. In the matter of use of protectors at telephone stations located in cities with cable distribution, it is recommended that the study be continued and that the United States Telephone Association be represented when consideration is again taken up of revision of the rules of the National Electrical Code and of part 3 of the National Electrical Safety Code.

This recommendation is made in view of the differences of opinion that exist as to the extent of the hazard at city stations where the distribution is principally underground or all-cable. The present situation in which a large number of telephone companies cannot agree that the rules as they stand represent the correct practice is very satisfactory. It is believed that further study and conference may result in the adoption of a set of rules to which all can agree.

2. In the matter of use of protectors at rural stations, it is recommended that steps be taken for the formulation of a recommended specification for the installation of approved protectors at rural telephone stations.

It is not recommended that the manufacturers abandon the mounting of protectors on local battery substation instruments, but it is recommended that they encourage the use of individual protectors of an approved type in the place of those on the instrument. A campaign of education should make it possible to eliminate the instrument protector within a few years.

Everstick

The standard anchor of companies whose engineering practice is standard for the industry.

Telephone companies of every size are using EVERSTICK Anchors because they are the best value in the world for holding hard and fast and for ease of installation.

Write for Details

Everstick Anchor Co.
ST. LOUIS, MO.

STEPHENS

CLIMBERS

Straps, Belts and Safetys

W. H. BUCKINGHAM
BINGHAMTON, N. Y.

FOR SALE OR TRADE

A new telephone exchange with 125 subscribers. 100-acre fruit farm close by. Fine proposition for married man. For particulars address J. K. Johnston, 903 Lemcke Bldg., Indianapolis, Ind.

PEERLESS Automatic Water Stills
Absolutely pure water for less than one or two cents a gallon, no matter how polluted your supply of water may be. For drinking, chemical or battery purposes the Peerless stills give you the best, ample supply at lowest cost.
Operated without attention other than occasional cleaning.
Write for complete details
SPARTA MFG. CO.
111 S. Hill Street South Bend, Ind.

$37.50 **Addressograph**

CHEAPER than typewriter—SAVES 20% of YOUR present costs — 5 to 15 times FASTER and BETTER than pen or typewriter.
FREE TRIAL will prove it!
No. 780 3-23
Easy Pay't. Terms
909 W. Van Buren St., Chicago, Ill.

HELP WANTED—Telephone cable splicer, thoroughly experienced, to locate trouble by means of a wireless test set. No other need apply. Permanent position. Apply Citizens Independent Telephone Co., 120 S. Seventh St., Terre Haute, Ind.